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In the Circuit Court of the United States,

FOR THE DISTRICT OF MARYLAND.

GEORGE WESTINGHOUSE, JR., and THE WESTINGHOUSE AIR BRAKE COMPANY *vs.* THE BOYDEN POWER BRAKE COMPANY. } In Equity.

(Decided March 11, 1895.)

J. SNOWDEN BELL,	BARTON & WILMER,
BERNARD CARTER,	COWEN & CROSS,
GEORGE H. CHRISTY,	HECTOR T. FENTON,
FREDERIC H. BETTS,	LYSANDER HILL,
For Complainants.	*For Defendant.*

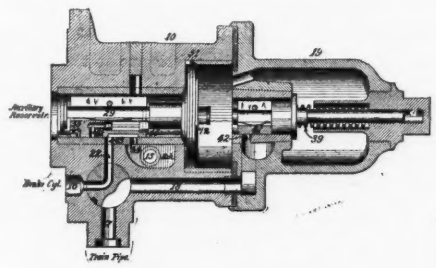
This is a bill in equity, in usual form, charging the defendant with infringing the Westinghouse patent No. 360,070, dated March 29, 1887, for a fluid-pressure automatic brake mechanism.

The Claims of Patent No. 360,070 in Suit.

The claims alleged to have been infringed by the defendant are claims 1, 2 and 4, which are as follows:

"1. In a brake mechanism, the combination of a main air pipe, an auxiliary reservoir, a brake cylinder, a triple-valve and an auxiliary valve device, actuated by the piston of the triple-valve and independent of the main valve thereof, for admitting air in the application of the brake directly from the main airpipe to the brake cylinder, substantially as set forth.

"2. In a brake mechanism, the combination of a main airpipe, an auxiliary reservoir, a brake cylinder and a



Westinghouse No. 360,070.

triple-valve having a piston whose preliminary traverse admits air from the auxiliary reservoir to the brake cylinder, and which by a furthey traverse admits air directly from the main airpipe to the brake cylinder, substantially as set forth.

"4. The combination, in a triple-valve device, of a case or chest, a piston fixed upon a stem and working in a chamber therein, a valve moving with the piston-stem and governing ports and passages in the case leading to connections with an auxiliary reservoir and a brake-cylinder, and to the atmosphere, respectively, and an auxiliary valve actuated by the piston-stem and controlling communication between passages leading to connections with a main air-pipe and with the brake-cylinder, respectively, substantially as set forth."

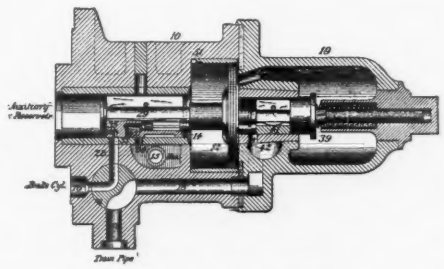
The only defense now urged by the defendant is non-infringement.

The Development of the Air-Brake.

The history of the pioneer invention of George Westinghouse, Jr., in fluid-pressure brakes, by means of which the brakes of a train of railroad cars can be operated by air-pressure controlled by the engineer of the train, and the history of the successive steps and inventions by which he has devised mechanisms adapted to apply that power so as to act automatically on each car, and the scope and fundamental importance of his later inventions by which he has accelerated, in an astonishing degree, the quickness with which the brakes can be applied, almost simultaneously, on each car of a long train consisting of as many as 50 freight cars, has been carefully and fully stated by Judge Townsend, who delivered the opinion in the case of Westinghouse vs. New York Air Brake Co. (59 Fed. Rep., 581), and by Judge Shipman in the same case on appeal (63 Fed. Rep., 962), and in the opinion of Judge Lacombe, filed Dec. 27, 1894, in a case between the same parties in the United States Circuit Court for the Southern District of New York.

Objects to be Attained in a Quick-Action Air-Brake.

The patent now in suit, No. 360,070, March 29, 1887, is the first of the Westinghouse patents in which he describes an additional function, engrafted upon his automatic air-brake, which is intended to be used only in cases of unusual emergency, and which is intended to meet the difficulties of applying air-brakes quickly on long trains. The purpose of the device was to increase the quickness of the serial action of the automatic brake mechanism on each successive car, by making the triple-valve device of each brake mechanism set in operation the valves on the car immediately in its rear, and at the same time to make use of the train-pipe air, vented for this purpose from the train-pipe at each triple-valve, so as to add its power to the power applied from the auxiliary reservoir of each car.



Westinghouse No. 360,070.

The result which Westinghouse was seeking in the new device, described in Patent No. 360,070, was first, and principally, to vent the train-pipe at each car, so as to quicken the serial action of the brakes from car to car; and, secondarily, to utilize the vented air and not waste its power.

Method by which these Objects were Attained.

Westinghouse discovered that he could accomplish this result by so constructing the ordinary triple valve of his automatic mechanism that, when in an emergency, the engineer, by widely opening his engineer's valve, and thereby causing a sudden and unusual release of pressure in the train-pipe, could cause the piston of the triple-valve to make an unusual and further traverse, and thereby actuate a valve, which opened a port by which the train-pipe air was admitted suddenly and directly into the brake-cylinder, without passing through the auxiliary reservoir.

This sudden release of air from the train-pipe vented that pipe at the first car, and that venting, in like manner, released the pressure in the train-pipe at the valve of the next car, and so on from car to car with almost instantaneous rapidity.

Defects in the Proportions of the First Valves Constructed.

It is shown that this device, as first constructed, was not entirely successful. It applied the brakes with greatly increased serial rapidity, as compared with any former device, and with much greater power, but not so quickly but that the rear cars impinged against the forward ones with destructive shocks.

The reason for this appears to have been that the operation of venting was not carried far enough, because the port opened by the auxiliary valve was not of sufficient size and did not release the full volume of train pipe air suddenly enough to vent it sufficiently. This defect was remedied by an improved mechanism, devised by Westinghouse and described in his patent No. 376,837, Jan. 24, 1888.

The Method is Successful and the Invention of Great Importance.

The success of this improved device has demonstrated that the invention, by which the further traverse of the triple-valve piston, beyond the extent of the traverse required for the ordinary application of the brakes, is made to admit a large volume of train-pipe air directly to the brake-cylinder, was one of great importance.

The proofs show that a quick-action automatic brake, which would give the results which this brake has accomplished, was eagerly sought after by inventors and car builders, and all had failed, until Westinghouse discovered that it could be done by this mode of operation.

In the cases above referred to, in which this patent No. 360,070, and the improvement on it, No. 376,837, were discussed with reference to the state of the art and the scope of the invention therein disclosed, these were held to be patents of a fundamental pioneer class, describing an invention of primary importance.

The Essence of the Invention is Independent of the Form of the Emergency Valve.

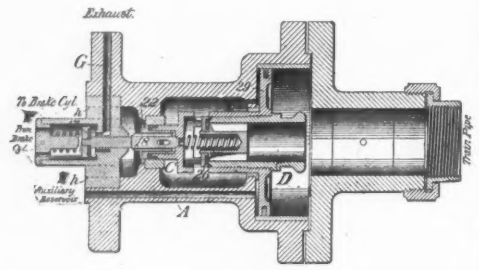
In those cases, the defendants, who were charged with infringing, were using a separate and independent valve to open the port to the train-pipe, and the question was whether or not Westinghouse was restricted to the form of independent valve and the precise mode of actuating it set out in his patent. It was held that he was entitled to a liberal construction of his claims, and that, in respect to the emergency valve, the form of his device was not of the essence of his invention.

Character of the Boyden Emergency Valve.

In the Boyden mechanism, which is alleged in this case to infringe, I have not been able to satisfy myself that Boyden makes use of an auxiliary valve, in the sense in which that term is employed in the specification and in some of the claims of the patent No. 360,070, now in suit.

It appears from the specification of Patent No. 360,070 that what Westinghouse meant by the auxiliary valve which is made one of the elements of the combination in the first and fourth claims, is such a valve as he has described in his specification, and which is independent of and performs none of the functions of the main valve of

the ordinary triple-valve device, and I am not satisfied, notwithstanding the very positive testimony of the com-

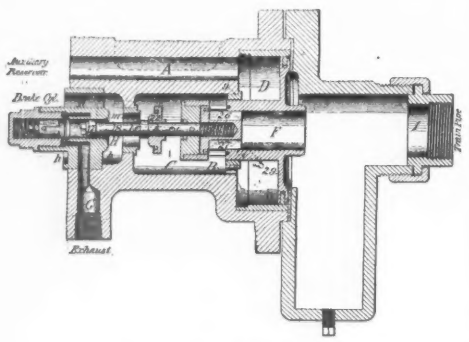


Boyden 1889 Catalogue.

plainants' experts, that the poppet-valve 22 of the Boyden mechanism is such a valve; for Boyden's poppet-valve 22 does, as I understand its operation, to some extent, perform the functions of a main valve of the triple-valve, as well as the function of Westinghouse's auxiliary quick-action or emergency valve.

The Boyden Emergency Valve not Independent of the Main Valve.

It is probably true that, in the Boyden mechanism, the stem valve *i*, *k*, *j*, which I take to be the equivalent of tne sensitive graduating valve shown in the Westinghouse Patent No. 220,556, October 14, 1879, is so constructed that it may do, and probably in most cases does do, the work of ordinary braking; that is to say, that by two or three successive applications of pressure through that smaller and more sensitive valve, the brake-cylinder is filled and the main valve 22 becomes non-essential, or, if lifted off its seat, is moved very gently; but valve 22 will, if the engineer uses his brake valve carefully, do the work of a main valve, as is demonstrated, I think,



Boyden 1891 Catalogue.

by the experiments in which the sensitive graduating valve *i*, *k*, *j*, was plugged up. So I take it that defendant's valve *i*, *k*, *j*, must be held to be the sensitive graduating valve usual in triple-valve devices since the Westinghouse Patent No. 220,556; and the defendant's valve 22 must be considered to be the main valve, and that in defendant's mechanism he has been able, by an ingenious arrangement, restricting the admission of auxiliary-reservoir air to the triple-valve chamber, to cause the main valve to do both main-valve work, when needed, and to do quick-action work, when needed.

Claims 1 and in Suit 4 Not Infringed by the Defendant.

As, by the explicit terms of claims 1 and 4, Westinghouse has restricted himself, as to those claims, to an auxiliary valve, independent of the triple valve, I hold that the defendant does not infringe those claims.

CLAIM 2.

Claim 2 reads as follows:

"2. In a brake mechanism, the combination of a main air-pipe, an auxiliary reservoir, a brake cylinder and a triple valve having a piston, whose preliminary traverse admits air from the auxiliary reservoir to the brake cylinder, and which, by a further traverse, admits air directly from the main air-pipe to the brake-cylinder, substantially as set forth."

The first three elements of this claim are the usual mechanism of an automatic air-brake; the remaining element, which was the only novel one at the date of the patent, is a triple valve having a piston which, by two distinct movements, performs two distinct functions, the first, its preliminary traverse by which it admits air from the auxiliary reservoir to the brake-cylinder, which is the ordinary effect of the usual movement of the triple valve piston, and the second, its further traverse, which is a new and distinct use, admitting air directly from the main air-pipe to the brake-cylinder, resulting in venting the main air-pipe and in producing the quick action.

The Broad Invention of Patent No. 360,070.

Now this, as I understand it, was the invention which Westinghouse brought to light. He discovered, and by experiment demonstrated, that, by a further traverse of the triple piston, train-pipe air could be vented from the train-pipe and that it would give two very important results, namely; first, quickening of the action of the brakes from the forward to the rear cars so that the application of the brakes became almost instantaneous on all the cars, and, second, utilixing the vented air for direct action in the brake-cylinder. Now, although quick-action emergency brakes were being sought for, no one before Westinghouse had accomplished this result and the means by which he accomplished it were entirely novel. Indeed, upon first impression, it is paradoxical and startling to find that, when a sudden, quick and powerful application of brakes is needed, in the face of impending danger, it is to be obtained by a sudden large release of the pressure in the train-pipe, to the extent of 15 or 20 lbs. below that in the auxiliary-reservoir, and that, by using this low-pressure air to operate the brake-cylinder, instead of the air under greater pressure stored in the auxiliary-reservoir, this remarkably effective application of the brakes is obtained. In the domain of quick-action brakes, this device would seem to belong to that class of pioneer inventions, the patents for which are to be construed so as to be co-extensive with the real invention, if the language of the claim will permit it.

Claim 2 of Patent No. 360,070 Covers all Quick-Action Triple-Valves operating by a Double Traverse of the Piston.

It is shown that Westinghouse was the first who used a further traverse of the triple-valve piston to perform the operation required to vent the train-pipe into the brake-cylinder to effect quick-action. The result was new and the means were new. His claim 2 is broad enough in language to cover every device in which that is done by the further traverse admitting air directly from the train-pipe to the brake-cylinder, substantially by the means described in the specification; that is, by the further traverse actuating a valve which so admits the train-pipe air.

The result accomplished by defendent's mechanism is identical with that of Westinghouse, and the means, by which the mechanism is actuated, so alike, that, in its published trade catalogue, defendant claims that cars fitted with its valves can be used on the same trains with the Westinghouse quick-action brake, because the engineer, in applying or releasing the air-pressure, may treat them as identical; the same functional operations of the valves, and the same results, being obtained from the same changes in the engineer's brake valve, so that there is strong *prima facie* reason to suppose that Boyden's way of using the same release of pressure to vent the train-pipe and to actuate the valves, which produces identical results, may be Westinghouse's way.

In Compressed-Air Mechanisms, Infringement Depends upon Functional Equivalents.

In mechanisms, actuated by air under pressure, the transmission of power is not visible to the senses as plainly as when it is done by cranks and levers, and being transmitted by an invisible agency in all directions in which the air can escape, the functions of the instrumentalities by which it operates are more important than their forms, and, in judging of an infringement, we are to direct our minds rather to functional equivalents than mechanical equivalents.

Boyden Merely Adapted Old Devices to Perform the Function Discovered by Westinghouse.

The use by Boyden of a central opening through the triple-valve piston, to admit train-pipe air to the triple-valve chamber, was not new, nor the use of a poppet-valve for the main valve of the triple, both of these constructions having been shown in the Westinghouse Patent, No. 141,685, August 12, 1873, and in others of his patents. So that there is nothing in the Boyden device not before exhibited in some one of the Westinghouse patents; except that he has been able to cause one of the valves of the triple (valve 22), at one stage of the application of brakes, to perform ordinary service work, and, at another, to do quick-action work. This Boyden does by an ingenious construction not before used, by which he restricts the passage of auxiliary-reservoir air into the triple-valve chamber, so that, when the further traverse of the piston suddenly unseats the poppet-valve 22, the port opened by it to the brake-cylinder is so large and the supply of auxiliary-reservoir air through the restricted passage so feeble, that the train pipe air raises its check-valve and vents itself into that chamber, and thence through the large port to the brake-cylinder. For the mechanism embodying this ingenious contrivance, by which the poppet-valve 22 is made capable of doing ordinary service-work by a careful, intermittent, slow release of pressure by the engineer, and quick-action work by a quick, sudden release; patents were granted to Boyden (No. 481,135, August 16, 1892, and No. 481,136 August 16, 1892); but, if this construction contains the underlying invention of the patent in suit, which was granted March 29, 1887, Boyden cannot make use of his improvement during the life of that patent.

Earlier Devices for Venting the Train-Pipe do not Anticipate the Westinghouse Quick-Action Invention.

It is true that, in searching for some device which would give quick action, Westinghouse had, before the date of the patent in suit, conceived the idea that it might be accomplished by venting the train-pipe at intervals along the train. He had tried having two or three vents, at intervals in the length of the train, controlled by electrical apparatus, and also had tried relief-valves placed in the pipe-coupling of each car, which would open to the atmosphere and vent the train-pipe quickly, in case of accident or other sudden release of pressure in the forward part of the train. This was shown in the Westinghouse Patent No. 217,838, July 22, 1879, but neither of these attempts were successfully applied, and they did not solve the problem of quick-action.

The problem was not solved; indeed, the first step in the direction of solving it does not appear to have been taken until the experiments which led to the Westinghouse Patent now in suit. The substance of the method then devised is the use of the sudden further traverse of the triple-valve piston to open a valve in a manner different from the valve opening made by the preliminary traverse for service braking, thereby admitting train-pipe air to the brake-cylinder, without its passing through the auxiliary reservoir.

The Boyden Device is Functionally the Equivalent of the Westinghouse.

In the Westinghouse apparatus, the further traverse of the triple-valve piston causes it to impinge against an additional, separate valve which admits the train-pipe air. In Boyden's apparatus, used by defendant, the further traverse pulls the poppet-valve 22, which Boyden

substituted for the ordinary main valve of the triple, suddenly off its seat thereby, in the manner before mentioned, causing the train-pipe air to raise the check-valve and flow with volume, through the triple-valve chamber, direct to the brake-cylinder. The device in Boyden's apparatus, by which the difference of pressures in the triple-valve chamber, between auxiliary-reservoir air and the train-pipe air, is produced and used, is ingenious and admirable; but the result obtained is just the same as when, in the Westinghouse apparatus, the auxiliary valve is unseated, and the means used are, in my judgment, functionally equivalent.

Under the ruling of Morley Machine Co. vs. Lancaster, 129 U. S., 263, and of the many cases cited in the opinion delivered in that case, the rights of a pioneer inventor are infringed by one who accomplishes the same result by means which, although never used for that purpose before, are mechanical equivalents for the means used by the inventor, under a liberal construction of his patent. It was said in that case by Mr. Justice Blatchford (p. 273):

"Where an invention is one of a primary character and the mechanical functions performed by the machine are, as a whole, entirely new, all subsequent machines which employ substantially the same means to accomplish the same result are infringements, although the subsequent machine may contain improvements in the separate mechanisms which go to make up the machine."

In McCormick vs. Talcot, 20 How., 402, the controversy arose over a device which McCormick had added to his reaper called a divider, intended to separate the standing grain to be left from that which is to be cut. The Court said:

"If he be the original inventor of the device or machine called the divider, he will have the right to treat as infringers all who make dividers operating on the same principle and performing the same functions by analogous means or equivalent combinations, even though the infringing machine be an improvement of the original and patentable as such."

In Machine Co. vs. Murphy, 97 U. S., 120-125, it was said:

"Nor is it safe to give much heed to the fact that the corresponding device in two machines, organized to accomplish the same result, is different in shape or form the one from the other, as it is necessary in every such investigation to look at the mode of operation or the way the device works, and at the result, as well as at the means, by which the result is attained."

The language of the Supreme Court in Consolidated Valve Co. vs. Crosby Valve Co., 113 U. S., 157-171, is applicable.

"The prior structures never effected the kind of result attained by Richardson's apparatus because they lacked the thing which gave success. . . . Taught by Richardson, and by the use of his apparatus, it is not difficult for skilled mechanics to take prior structures and so arrange and use them as to produce more or less of the beneficial results first made known by Richardson."

It is true that a patentee can claim nothing beyond the scope of his patent (Keystone Bridge Co. vs. Phœnix Iron Co., 95 U. S., 274), but the scope and meaning of a broad claim in the patent can only be interpreted by an understanding of the real scope of the invention itself.

If the Westinghouse patent now in suit is for an invention of a primary character, and if the gist of that invention is the use of the future traverse of the triple-valve piston to open a valve which admits air directly from the train-pipe to the brake-cylinder, with the result that the train-pipe is vented and the train-pipe air utilized, then it appears to me that the defendant cannot exculpate itself from the charge of infringement by the fact that, in its device, the train-pipe air is admitted through the triple-valve chamber and not through a by-passage, nor by the fact that in its device the further traverse of the piston opens the main valve in a special manner, which produces the same result, but does not make use of a separate auxiliary valve; provided, Westinghouse has not by the explicit terms of his claim 2 restricted himself to the use of an auxiliary valve.

I do not think Westinghouse has so restricted himself in claim 2, although he does appear to have done so in claims 1 and 4.

The Patent Office Amendments do not Narrow the Scope of the Patent.

There is, without question, some difficulty and embarrassment in the broad construction of claim 2, growing out of the proceedings in the Patent Office, as shown by the file wrapper and contents; but, considering what was the real invention, I am not of the opinion that the legal effect of those proceedings is to restrict claim 2 to a device containing a separate auxiliary valve.

From the contents of the file wrapper, it appears that, as the application was prepared, the first claim of Patent No. 360,070 differed from that which now appears in the patent as granted.

The claim I first proposed was

"1. In a brake mechanism, the combination of a main air-pipe, an auxiliary reservoir, a brake-cylinder, a triple valve provided with a device for admitting air directly from the main air-pipe to the brake-cylinder, substantially as set forth."

It was objected by the Patent Office Examiner that this claim, and also claim 2, were anticipated by Patent No. 280,285, to G. A. Boyden, June 26, 1883, and the Examiner requested that a working model of the triple valve should be furnished.

Boyden's Earlier Patent did not anticipate the Quick-action Triple-valve Invention.

Boyden's Patent of 1883, No. 280,285, was a form of triple-valve mechanism, intended for use with Westinghouse's automatic air-brake, the object of which was to provide for replenishing the auxiliary-reservoir of each car when the pressure therein had been lessened by leakage and while the brakes remained applied. This was done by the engineer causing, not a release, but a slight increase of the pressure in the train-pipe air, which, acting upon a check-valve in the centre of the triple-valve piston, by a peculiar arrangement of the valves, caused train-pipe air to pass together with auxiliary-reservoir air to the brake-cylinder. The object, function and result of whatever was new and patentable in this Boyden device was altogether different from the object, function and result of the Westinghouse device in Patent No. 360,070, and there seems to be no analogy or comparison which can be made between them.

It is true that the "always-open one-way passage" in the Boyden patent which, when the check-valve was raised, allowed train-pipe air to reach the brake-cylinder, was, in the language of the cancelled claim 1 of No. 360,070, "a device for admitting air directly from the main air-pipe to the brake-cylinder," and there were other devices, used by Westinghouse himself, which this wording would include; and the claim was, therefore, justly open to the criticism of the Patent Examiner; but there was no similarity in the means by which the two devices were actuated, no similarity in the object to be accomplished, and no similarity in the mechanical principle of operation. It was simply a fact that there did exist in the Boyden device a passage for train-pipe air direct to the brake-cylinder, which the engineer could cause to open by a slight increase of train-pipe pressure; but there was no hint or suggestion of the important discovery how that fact could be utilized to accomplish the entirely new function necessary to create a quick action brake, when, in an emergency, quick-action was needed; and how, when quick-action was not needed, it should not interfere with ordinary graduation and service stops. This Boyden device was not in the direction of quick-action, but its opposite.

While, therefore, it was proper that Westinghouse's original claim 1 should be corrected, so as to express more definitely his real invention, this was not because the Boyden Patent, in any manner whatever, anticipated that invention, or suggested it in any of its functions.

The Disclaimer in Patent No. 360,070 does not weaken the force of the claims.

For the same reason, there was then inserted in the specification of the Westinghouse Patent No. 360,070, this clause:

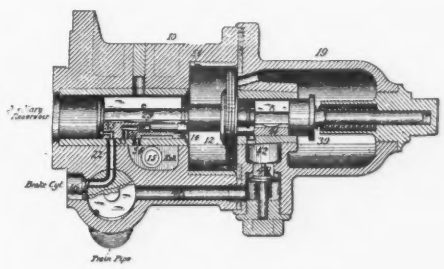
"I am aware that a construction, in which 'an always-open one-way passage' from the main air-pipe to the brake-cylinder is uncovered by the piston of the triple-valve, simultaneously with the opening of the passage from the auxiliary-reservoir to the brake-cylinder, has been heretofore proposed, and such construction, which involves an operation different from that of my invention, I, therefore, hereby disclaim."

In the Boyden infringing device now used by the defendant, the passage from the main air-pipe to the brake-cylinder is not "uncovered by the piston of the triple-valve, simultaneously with the opening of the passage from the auxiliary-reservoir to the brake-cylinder;" if it was, the defendant's mechanism would be always a quick-action brake and never anything else; but, on the contrary, in the infringing device, the passage is not opened until there has been a sudden further traverse of the piston, which then brings it into operation for the distinct purpose of quick-action. The statement of the so-called disclaimer is strictly true, that the construction of the Boyden 1883 Patent "involves an operation different from" the Westinghouse invention, and the so-called disclaimer in reality disclaims nothing which has relation to the Westinghouse quick-action invention.

The Right to Claim the Integral Valve Arrangement in 360,070 was not Forfeited.

The disclaimer was substituted in the place of the following, which had been in the specification, and was cancelled:

"Further, while in the specific construction described and shown, the function of admitting air from the main pipe is performed by a valve separate from that which effects the preliminary admission of reservoir-pressure to the cylinder, a modification, in which the same office is performed by a valve integral with the main valve and formed by an extension thereof, would be included in and embody the essential operative features of my invention."



Westinghouse No. 360,070.

The testimony tends to prove that this clause of the specification was taken out because the Examiner objected that no such form of triple-valve was illustrated in the drawings. For whatever reason it may have been cancelled, it is not a necessary result that the patentee is precluded from claiming that his patent covers other forms of valve, integral with the main valve, if such is his legal right, when his invention, as disclosed in his patent, is found to be a broad one, and if he is not restricted by his claims and if he has done nothing to impair his right to be protected in his whole invention. The

effort should be to preserve, rather than to forfeit, the inventor's rights.

Keystone Manufacturing Co. vs. Adams, 151 U. S., 144.

The object and scope of the invention, and the means employed to effect his object, are thus stated by West inghouse in the specification of his patent in suit:

"The object of my invention is to enable the application of brake-shoes to car wheels by fluid pressure to be effected with greater rapidity and effectiveness than heretofore, more particularly in trains of considerable length, as well as to economize compressed air in the operation of braking by utilizing in the brake-cylinders the greater portion of the volume of air which in former practice was directly discharged into the atmosphere. To this end, my invention, generally stated, consists in a novel combination of a brake-pipe, an auxilliary-reservoir, a brake-cylinder and a triple-valve device governing, primarily, communication between the auxiliary-reservoir and the brake-cylinder, and, secondarily, communication directly from the brake-pipe to the brake-cylinder."

This language exactly describes the infringing mechanism of the defandant.

The amendments made to meet the objections of the Patent Examiner are not to be construed to disclaim the patentee's actual invention, if such construction can be avoided without doing violence to the obvious meaning of the language.

Lake Shore Railway Co. vs. Car Brake Co., 110 U. S., 229-236.

Reese Button Hole Machine Co. vs. Globe Button Hole Co., 61 Fed. Rep., 958.

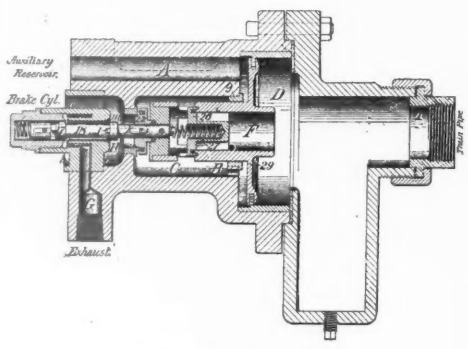
The Validity of the Patent Is not Impaired Through the Defective Character of the First Valves Manufactured.

It has been urged that the invention disclosed by the patent in suit is not of a meritorious character, because, in the form in which it is there embodied, or at least in the first mechanism manufactured by Westinghouse, it failed of success in some essentials, and was immediately improved by Westinghouse, in a manner which was the subject of a subsequent patent, before it was successful in the use for which it was intended. The defect developed by experimental test, and which Westinghouse in a few months remedied, was that the opening uncovered by the auxiliary valve was not sufficiently large to suddenly release the full volume of train-pipe air. This was not a defect inherent in the device (59 Fed. Rep., 581-591).

There were structural objections to making that opening large; but, when made larger, the device answered the purpose for which it was intended. It was thought, however, better to remedy the difficulty by adding an auxiliary piston, as well as an auxiliary valve, and it was in that line that Westinghouse carried his further improvements, and he has adopted that form, as the best to be manufactured for general use.

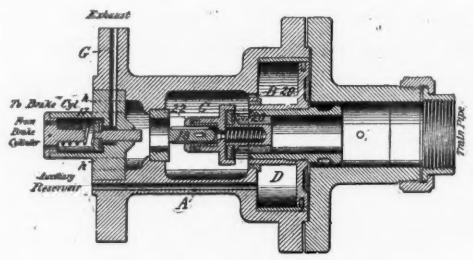
This defect in the patent in suit was not radical, and was only one of those defects common in the first forms of many pioneer inventions, which usually have to be improved upon before they attain commercial success.

It is further urged that in a doubtful case the scale should be turned by the fact that, subsequent to the date of the patent in suit, indeed, more than two years after the institution of this suit, Patents Nos. 481,135 and 481,136, Aug. 16, 1892, were granted to Boyden for the mechanism now used by the defendant.



Boyden 1891 Catalogue.

Boyden was entitled to patents for whatever was a patentable novelty in the devices by which he was able to make his valve 22 answer for both service and quick-action work, in connection with the restricted passage *B*, and for any other patentable novelty in the forms of his mechanism. The widely different forms in which he has illustrated his devices in the two above-mentioned patents show that, taking what Westinghouse had discovered and demonstrated to be the underlying principle of a quick-action brake, a skillful and inventive mechanic can devise many forms for applying it.



Boyden 1889 Catalogue.

But, in his specification of Patent No. 481,135, Boyden alleges that his device differs essentially from Westinghouse's Patent No. 360,070, and involves a new mode of operation. The question whether it does or not, was the very question pending in this suit, and, so far as the Examiner passed upon it, in allowing the specification to stand, he did so upon the *ex parte* application of Boyden and unassisted by testimony as to the state of the art at the date of the Westinghouse Patent, without testimony as to the scope of the Westinghouse quick-action invention and its great importance and merit; and, therefore, without the opportunity of judging whether or not it was a pioneer invention of a fundamental character, entitled to a construction co-extensive with the invention, or was simply a patent for an improvement in a known art, to be restricted to the form of the device shown in the model and illustrations.

The determination of that question is the starting point in the consideration of the controversy and, in my judgment, the fact that Westinghouse was the first discoverer of the vital underlying invention, should turn the scale in his favor

An Injunction and an Accounting is Ordered.

The complainants are entitled to a decree for an injunction and account, with a reference to a Master in the usual form.

RAILROAD GAZETTE

FRIDAY, APRIL 5, 1895.

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Contributions.

The Air-Brake Suits.

BALTIMORE, Md., April 1.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The Boyden Brake Company does not propose, by now appearing in print, to depart from its course hitherto pursued of trying the question of alleged infringement of the Westinghouse patent by their quick-action triple valve in the courts rather than in the newspapers.

It is thought proper, however, to state that in the suit pending in the United States Circuit Court for the District of Maryland between the Westinghouse Air-Brake Company and the Boyden Brake Company three claims of the Westinghouse patent of March 29, 1887, No. 360,070, were alleged to be infringed—the first, second and fourth. The Westinghouse company contended that the Boyden company made use of an "auxiliary valve" as covered by said patent; the Boyden company denied this and contended that in their device the "triple valve" admitted the train-pipe air to the brake cylinder without the use of an "auxiliary valve." The Court decided that Boyden does not use an "auxiliary valve," and to this extent sustains the Boyden company's position, holding that there is no infringement of the first and fourth claims.

As to claim two the Court decides that it is infringed. From this adverse decision as to claim two the Boyden company will take an appeal to the United States Circuit Court of Appeals.

CHARLES B. MANN, *Secretary.*

The Railroads and Electric Competition.

NEW HAVEN, March 28.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The fight which the New York, New Haven & Hartford Railroad is waging against the competition of electric lines has much more than a merely local interest. It marks a very definite step in the encroachments which electric roads are making every day, and in every quarter, upon the territory of their older rivals. In most cases the railroads have either not waked up to the growing importance of such competition, or have yielded to conditions which seemed inevitable, as in the case of suburban travel near large cities. There is so small a basis of experience on which to make exact estimates of the relation of these electric lines to the traffic of the railroads that the managers of the latter have generally followed a waiting policy in the whole matter. No one ventures to predict the future of these new roads, and the steam railroads cannot tell just how they are to defend themselves until they can see clearly in what quarter they will be attacked, and how heavy their losses are likely to prove.

In this matter the Consolidated road has been the first to attempt an accurate calculation of the results of electric competition on it passenger traffic. Its figures, which have been obtained with some difficulty, are very imperfect, but are the only statistics we have on this subject. As this road maintains a complete monopoly in its territory, it watches with great alertness any newcomers, and, since it has great power in the Connecticut legislature, the most natural form of defense which it adopts is an appeal for legislation in its favor.

The present investigation discloses the fact that these short electric roads have nearly paralleled the entire system of the Consolidated road between New York and Boston, which thus furnishes a better chance to watch the effect of such competition than is offered by any other railroad at the present time. The total mileage of these electric lines is 382 miles, divided as follows: On the New York and New Haven division, 166 miles; on the Old Colony, 216 miles, and of this total all but 88 miles are completed and in operation. It is interesting to notice the grouping of the lines about the larger towns: On the New York division, 30 miles; Hartford, 60 miles; Plymouth division, 104 miles; Providence division, 43 miles.

Again, it is a marked fact that these lines are not merely extensions of street railroads, running between a town and its small suburbs, but are being built, in increasing numbers, to run across country between the smaller towns. This latter class of electric lines is peculiarly dangerous to the traffic of the steam railroads and against these the managers of the Consolidated direct their main attack.

The figures which have been collected cover the period from Dec. 1 to the first of this month.* It is thus important to notice that these months are necessarily the least active part of the year for the electric roads, and that consequently the figures for the three summer months would make a vastly more impressive showing. On the New Haven system the summary of business between points where there is electric competition shows a loss of over $4,000 for each of the winter months. The decrease on the Old Colony is not quite so marked, because many of the competing roads were in operation during the preceding year. It must be remembered too that this loss occurred in spite of a general increase of passenger traffic over 1893 for the whole system, and that the amount of this loss must increase rapidly as summer approaches. On this basis the railroad asks the Legislature to refuse charters to electric lines which parallel the older road, and especially to restrict these new carriers to city and suburban traffic, and forbid their cross-country extensions.

This certainly seems like a rather bold request for a railroad to make, but the Consolidated has, in the past, had everything its own way in Connecticut. Unquestionably too, some of its claims are just. It has a right to be allowed to lessen its train service where the public are deserting to the electric roads. Again, where it has built and operates non-paying branches to small towns, it seems fair that it should be protected, because of the service it has rendered the public at a loss to itself.

But, with the exception of these cases of minor importance, the contention of the Consolidated road does not bear analysis. It is the old outcry of vested interests against improvements which hurt them but inure to the benefit of the community. When we come to examine the situation we find in all the cases of competition with the railroad, that the electric roads run from three to six times as often, charge from one-half to one-quarter of the railroad fares, and, over and above this, leave the passenger at his own door. In view of this, it seems as if the old story of the struggle of the stage coach lines against the steam railroads might be read with appropriateness to the officers of the Consolidated road.

It is evident that the request of a railroad to the Legislature for protection against electric roads is a form of defense against this new competition which cannot prove successful, because it is generally unjust, and cannot even be tried unless the railroad is in a position of peculiar power. The present example of the Consolidated road becomes thus of particular interest. Electric competition is evidently soon to be a very important factor in passenger traffic on most of our railroads. It seems certain that these new lines will before long begin to do a parcels-express business, and can carry this on with great efficiency. Beyond this, it is quite probable that they may eventually carry heavier freight to some extent. With this outlook, how are the steam railroads going to defend themselves? The alternative seems to be before them, either of employing electricity to a large extent on their own lines, and building cheap branches to control the traffic now in the power of these independent roads, or of buying up the electric lines outright, and operating them as an integral part of each railroad system. The financial success of such operations are, of course, at present wholly uncertain. At any rate, few of our railroads can adopt the plan of the Consolidated road with any chance of success. For it is the convenience of the public which must finally decide the question of competition between electric and steam railroads, and it is idle for any one to claim that electric lines shall be confined to the limits of the old horse-car roads in our larger cities. * * *

* See *Railroad Gazette*, March 29, page 201.

A Suggestion for New York Rapid Transit.

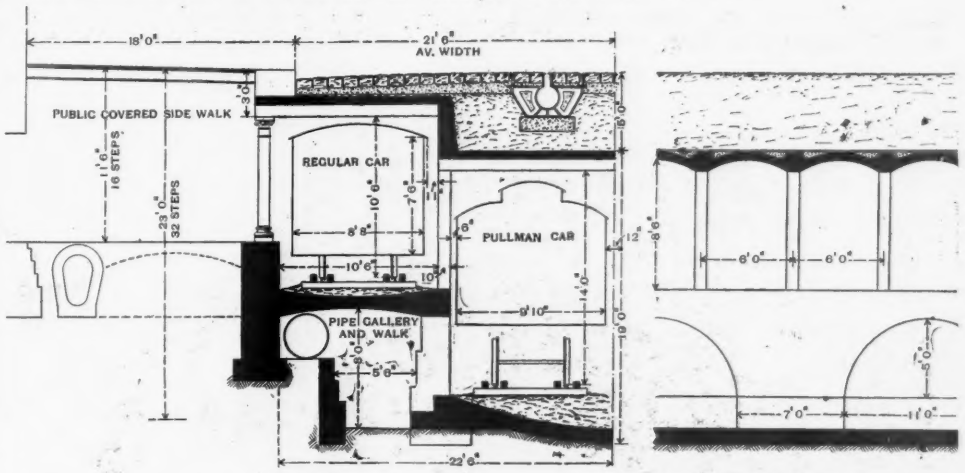
NEW YORK, March 29, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In reply to your editorial of March 29, in which you refer to the Simplon tunnel and its width of 15 ft. 5 in. for each track, I beg to state that these two single tubes were each 12½ miles long without any interruption. Under these circumstances the width left a walk of 2 ft. 9 in. on each side, which cannot be called abundant, while the New York plans call for a width of 12½ ft. so that there remains with a car of 8 ft. 8 in. a width of walk of 3 ft. 10 in. If we consider that there are to be four communicating tracks and consequently three such spaces of 3 ft. 10 in. and two more outside, further that the express tracks will be operated during a few hours only, and then only in one direction, and finally remember the proximity of stations, I feel myself entitled to call this tunnel of 50 ft. extravagant in width.

The same reduction which I propose (11 ft. center to center), and which reduces the distance between cars to about 2 ft., was recommended in 1891 by all the experts, including Mr. William Barclay Parsons, so that I do not believe that I am in such bad company as the term "error" which you use, would cause one to suppose, but I prefer to stay where I am as long as there are no satisfactory reasons put forth for such a change of mind.

It is out of the question that the larger the tunnel the better, everybody knows that. It is just the same as owning a larger house or drawing a larger income, but is there sufficient space at disposal to build this larger house, and is there money enough to pay this increased income? Mr. Parsons replies, Yes, to this question. Suppose he is right, which I doubt very strongly, or there were at least more money to be had by the help of future legislation, there remains to be answered: Is it an absolute necessity, is the money for it well spent, and could the space not be used better otherwise? I believe that there the advocates of the larger tunnel must fail to give satisfactory proof.



Cross Section. *Longitudinal Section.*

Another Suggestion from Mr. von Emperger.

There are two questions to be considered if we assume the size of the car (8 ft. 8 in.) as a settled thing.

1. What is an adequate clearance between a train and an adjoining wall and also between two moving trains.

2. Shall a tunnel of four communicating tracks with stations half a mile apart be provided with one foot-wal between each track, or is it sufficient to use only refuges?

Reply to No. 1. My proposal is to place the wall so as to give 11 in. clearance (10 ft. 6 in. full width) while moving trains remain 22 in. distant. There is an exception taken in case of a Pullman car from the New York Central to be run from Forty-second street down, for which a clearance of 6 in. or 12 in., respectively is assumed (10 ft. 10 in. full width of express tracks from Forty-second street down). As a reference to foreign example I may state that 4-6 in. is used for loaded cars on the German normal gage (except sideway on account of curves), and in the Budapest tunnel 7½ in. was considered sufficient. On the walk in the Simplon tunnel, referred to above, a man or material will be at the same distance from the train, so that it seems to be satisfactorily proven that this distance will neither be a hindrance to speed or to safety.

Reply to No. 2. We can only judge this by example. The Budapest subway is in my opinion the nearest to the proposed tunnel in New York and is consequently the best example where no walk was deemed necessary. It is two miles long and has two communicating tracks. But there are quite a number of single tube tunnels used for suburban traffic which have no footwalk at all and are still in successful and satisfactory operation.

It must be borne in mind—

1. That a track in a tunnel does not require such constant maintenance, cleaning and repair as the tracks on an elevated road.

2. That there is sufficient time when the traffic runs low to do this work.

3. That in case of an accident it does not make much difference if there is one foot more clearance or not. On the other hand it is important that the train, by a derailment, cannot blockade another track and knock out an

iron column and be buried under the tumbling down roof. You will see that this point is fully considered in my plans limiting all tracks by masonry, as by a kind of guard rail, so that an accident cannot be disastrous to other tracks or to the tunnel itself.

On the basis of these arguments, a distance of 11 ft. center to center is proposed without walk and refuges, as shown.

But, nevertheless, if a walk would be required or desirable, I submit you a design of mine which shows that they can be arranged in such a way as not to interfere with the other tracks. In the adjoining cut, the arrangement of walk near the express track and another near the local track is shown; the latter to be a covered sidewalk for the public at the same time.

There is and there will be no trouble in getting rapid transit for New York, and the only question is, will it be accomplished with reasonable economy. Between the size of a four-track subway corresponding to that in Budapest (38 ft.), which means an economy at any price, and the adopted plans (50 ft.), my plans represent an economical mean (44½ ft.). I do not want to be understood as insisting on every inch I propose, but only want to stick to such a medium width which leaves sufficient room for pipe-galleries below the untouched vaults, and confines the tunnel to the road only.

FR. VON EMPERGER, C. E.

The St. Louis Union Passenger Station.

The new Union passenger station at St. Louis, which was opened on Sept. 1 last, was described in the *Railroad Gazette* of July 24, 1891, and Aug. 24, 1894. As there was no accessible place from which to get a good photograph of the head house, as a whole, it was necessary to use the architect's drawing for a general view. Satisfactory views of the interior have not been obtainable until now, but we have the pleasure of showing a number of them in this issue together with perspective views of the train shed.

As the view of the train shed is rather unsatisfactory in consequence of the presence of surrounding buildings, we give in Fig. 1 an outline drawing showing the style of the roof trusses. Bearing in mind that the highest point of the roof is 100 ft. from the floor the reader can get from this some idea of the great width of the shed, which is 606 ft. × 630 ft., nearly as broad as it is long. The interior perspective view also affords a good opportunity to estimate the vast area of the floor, which, including the "midway," is about 424,200 sq. ft. Over 2,700 tons of steel was used in the construction of this shed and the glass in the roof aggregates 95,000 sq. ft.

The general appearance is that of a single flat arch supported on columns. The top of the roof at the side is 29 ft. from track level; and these points are connected by a circular arc with a radius of 866 ft. The ends of the shed are faced with corrugated iron, draped to cover the trusses; with an apron extending to within 20 ft. of the track level, in which is set corrugated glass in sheets varying in length from 40 ft. to nothing. Over this roof are projecting ventilating and lighting bay segments in alternate panels 30 ft. wide, stretching across the entire

Interior of Train Shed, St. Louis Union Station.
Looking northeastward toward the headhouse.

Train Shed and Track Approaches, St. Louis Union Station.

Note.—A considerable portion of the train shed is hidden by the buildings in the foreground. The extreme left and right sides of the shed would be just outside the edges of the engraving.

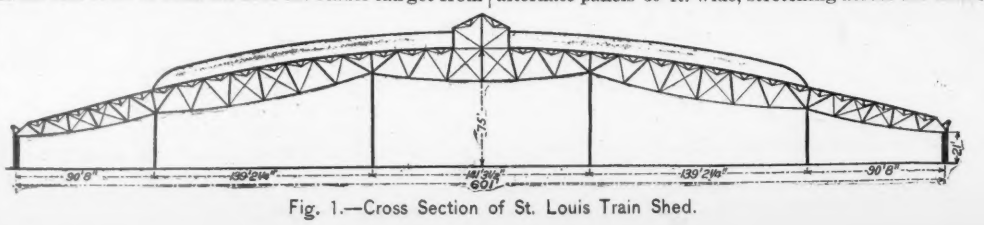
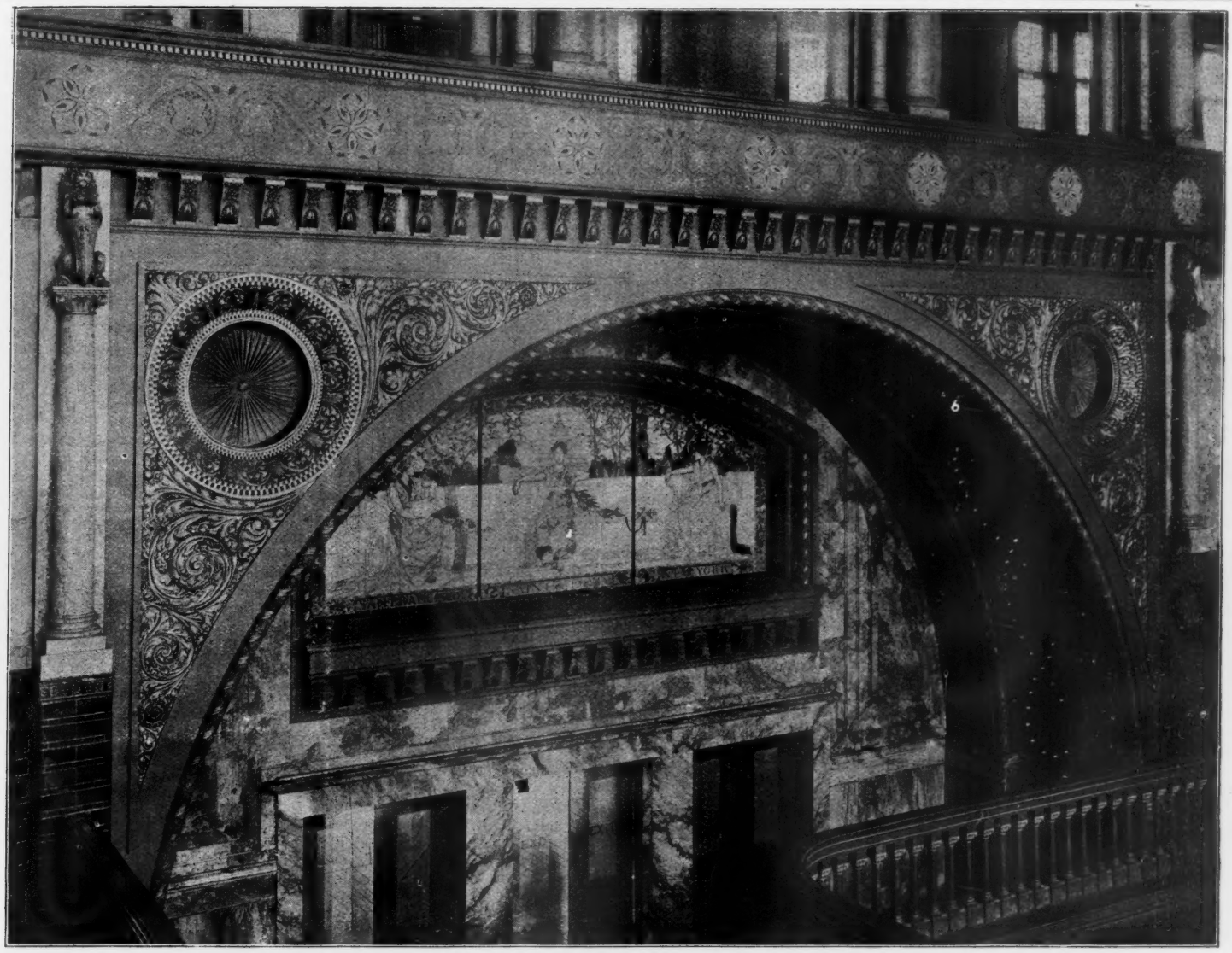


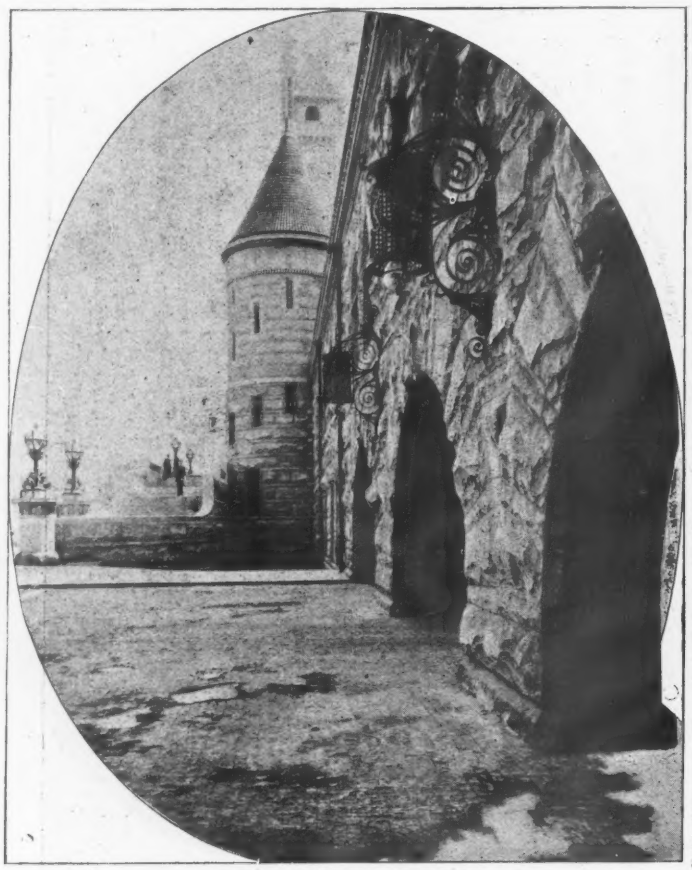
Fig. 1.—Cross Section of St. Louis Train Shed.



Golden Arch Over Stairs Leading From the Grand Hall to the Main Entrance (Market Street).

St. Louis Union Station: The Grand Hall on the Opening Night, Sept. 1, 1894.
From a Flash-light Photograph by B. A. Atwater.

roof, with the exception of 90 ft. on each side; these project 10 ft. above the general roof, and their sides are filled in with corrugated glass. The entire roof is covered with dressed two-inch flooring, with the dressed side exposed under the shed. Upon this decking the entire roof was again covered with tin. On the sides ample gutters are provided in the roof. The drainage of this



West Approach, Market Street.
St. Louis Union Station.

vast area—almost ten acres—was provided for by means of down spouts every 30 ft. on each side of the structure. In the center of the shed, throughout its entire length, additional light is provided by a skylight 36 ft. wide, covered with corrugated glass, supported by copper bars. The sides of the central skylight provide ample ventilation.

Looking at the interior of this shed, it will be found that the space covered is divided into five spans; the two outer, each 90 ft. 8 in. between centers of columns; the two immediately adjoining these each 139 ft. 2¼ in., and the center span 141 ft. 3½ in. The two outer spans have straight top chords; the two immediately adjoining and the center span, owing to the curvature of the roof, are of one length, the top chord conforming to the curve and the bottom chord draped. All lower chord panels are of uniform length, all top chords of uniform length and all posts of one length throughout the entire structure for these three spans. The two side spans also have all top chords of one length and all bottom chords of one length.

The main trainshed is 630 ft. long, supported on columns at its outer lines every 30 ft. The intermediate lines of columns are spaced 60 ft. apart lengthwise of the structure, supporting the intermediate trusses of the roof, by means of trusses connecting these columns. The shortest columns are 20 ft. long; the longest 62 ft. $3\frac{7}{8}$ in. The ancorage of the structure is entirely at the outer columns, which take care of all wind stresses. The intermediate columns are all pin connected at bottom. The only provision for expansion and contraction at the tops of the columns for the trusses is provided at each end of the center span. At the south end of this structure, the last span of 30 ft. is thoroughly braced to the ground, forming towers, where columns exist, thus providing the necessary strength against wind strains in that direction.

In the designing of this structure, the stresses were calculated for dead load and snow to equal 40 lbs. per square foot of vertical surface.

The ground on which this structure was erected was formerly a part of the vast lake filled some 20 years ago with all manner of debris, making it necessary, on 64 of the 92 piers, to drive from 6 to 9 piles. These were driven with an 8,000 pound steam hammer to the proper depth, from 5 to 9 ft. below the surface, before excavations were made. Concrete foundations were used throughout the entire work, made of Portland cement, all outer piers capped with Missouri granite, and the inner piers with Bedford limestone.

The book describing the station, a notice of which appeared in our last issue, and which contains "chemigraphs" of the views which we print to-day, shows some interesting statistics concerning the improvement as a whole. The ground occupied by the headhouse and trainshed aggregates 11.1 acres, and the whole station, including the approaches as far out as the powerhouse, occupies 20 acres. In addition to this the Terminal Association has acquired during the last three years additional land for side tracks, freight yards, shops, etc. amounting to 22 acres more.

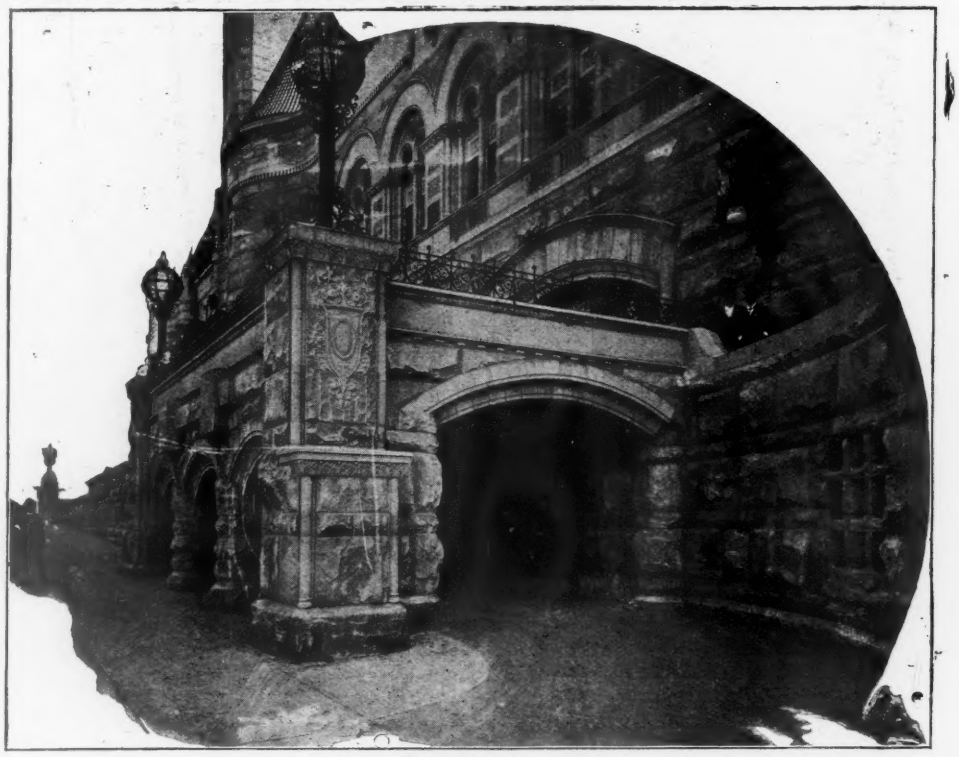
The 31 tracks in the trainshed aggregate a length of 3½ miles. The switches in the tracks of the approaches number 130 and the signals 103. The interlocking machine is the largest of the kind ever made. This machine, which is shown in one of our views, has mechanical and electrical interlocking combined and there are 131 levers. Air whistles, controlled from the cabin by electricity, are located at 18th street, 21st street and on the signal bridge south of the trainshed. These whistles are for arresting the attention of enginemen whenever they make a wrong movement and are also used for signaling to repair men. There are in this plant 99 single switches, one single slip, 12 double slips and 10 movable frogs. All the signal lamps are lighted by electricity and four main line signals at the neck of the yard have illuminated blades.

It will be noted from the view showing the westerly end of the grand hall that the smoking room is in this end of the building, which is the result of a change made after the publication of the floor plans which were shown in the *Railroad Gazette* at the time the building was begun.

The designer of the headhouse was Mr. Theodore C. Link, of St. Louis, and he was subsequently engaged as Superintendent of Construction. The train shed was designed by Mr. George H. Pegram.

Employees' Building at the St. Louis Union Station.

The Young Men's Christian Association, Railroad Department, at the Union Station in St. Louis, is to have a new building to cost about $60,000. The Directors and Managers of the railroads terminating at this station have had the subject under consideration for some time, and last week, acting through the Terminal Railroad Association (the Board of Directors of which is composed chiefly of officers of the principal roads using the station), voted to donate the land and to guarantee the interest upon $50,000 bonds to be issued by the Y. M. C. A. Railroads which are tenants of the Union Station will be assessed, upon a wheelage basis, for their share of the annual interest, although it is possible that they will never be called upon to make any payments, as the club-house is designed to be self-sustaining. Plans for the new building have been made and contracts will be let soon. The structure will contain a dormitory, baths, parlors, reading-rooms and all the accessories of a well-managed and comfortable club.

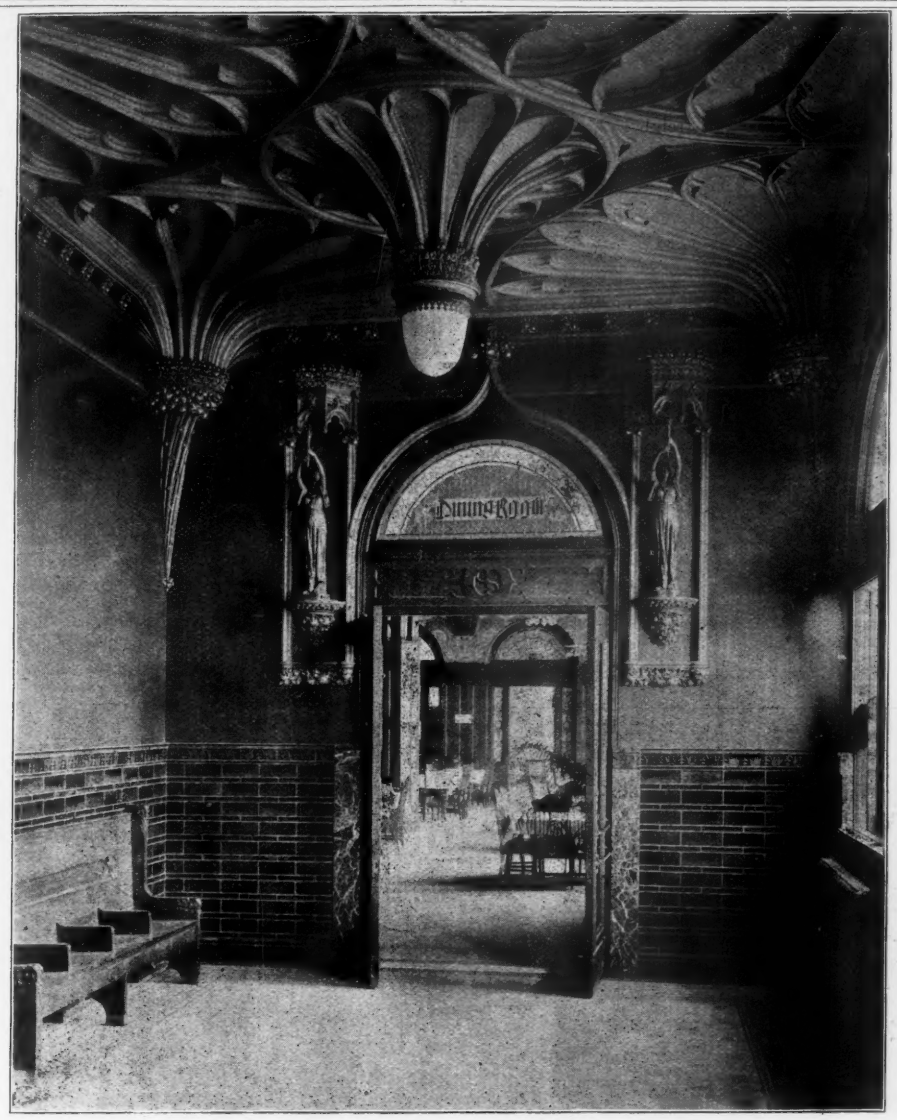


Porte Cochere.
St. Louis Union Station.

Notes on the Field Inspection of Bridges.

The inspection of a bridge at its site of erection is of no less importance than its inspection in the shop. Indeed, the one cannot be said to be complete without the other, for the excellence of workmanship obtained in the shop may be rendered almost valueless by an insufficient or incompetent inspection in the field. There has been, unfortunately, a tendency on the part of some engineers to subordinate field work, and frequently a raw and inexperienced employee is sent out, instead of a man who has a practical knowledge of steel construction, and one who also ought to have, if possible, some knowledge of the principles which govern bridge design. A number of railroads, of course, have special men for the purpose, and others again employ an agent of some inspection bureau, but on small roads, and especially those in the west, either a draftsman, or, sometimes, the superintendent of bridges is detailed to do the work. The latter, while he may have an excellent knowledge of bridge construction in wood, is often conspicuous by his absolute ignorance of the same work in steel. These remarks do not apply to the larger and more successful railroads, but they are only too true in a large number of cases, and, as a result, many embarrassing and awkward controversies often occur between the inspector and the foreman in charge of the work. The foreman is generally selected and his competence measured by his ability to rush the work through as rapidly and cheaply as possible, which means that he will strongly object to, and will avoid doing, any extra work beyond that which is absolutely necessary to erect and rivet the structure in place.

What are, then, the duties of the field inspector. In the first place he should endeavor to be at the erection site at least every day so that any question which arises may be settled as quickly as possible. At the commencement of the work the unloading of the material should be watched to see that it is not bent or otherwise maltreated. If heavy weights are to be lifted, the hoisting chains should be tested by having them safely lift the greatest load they will ever be called upon to handle. All marks of the transit or level-man should be placed, if possible, in such a position that they can be verified after the completion of the structure. The centre marks for the shoe plate in a truss span, for instance, should be drawn out to the edge of the masonry so that its position can always be checked. It is a good plan to have a little dry cement placed under the shoes, especially where the hammer-dressing of the masonry has not been very carefully finished, so that the shoe may take a full bearing. Care must be taken to see that the right amount of camber blocking is placed under the bottom chord. If this is not attended to, and a mistake occurs, the top roller shoe plate is apt to pull off from the bottom one, necessitating, in bad cases, the jacking up of the span to adjust them. The inspector should examine, and carefully watch the building of the false work, devoting special attention to it, if the work is over a rapid river, where freshets are liable to occur. During the progress of the work the railroad track must be kept in line, and if, owing to unequal settlement of the bents or other causes, unevenness occurs, the stringers supporting the rails should be immediately blocked up. It is, indeed, better always to keep a track on false work an inch or two above grade line, and thus avoid a possible chance of accident. The work must be so arranged that no avoidable delay occurs to passenger trains and the inspector should see that the track is clear a minute or two before the trains are due. He must see that the bridge members are not injured during erection, and it is advisable to have a guide line attached to the pieces while they are being hoisted to keep them steady; with eyebars this precaution should never be omitted, as once bent it is very troublesome to straighten them properly with the facilities usually available in the field. Pilot



Entrance to Dining Room in Gothic Corridor.
St. Louis Union Station,

nuts, with wooden rams to drive the pins, should be insisted on, T-rails for this purpose not being allowed, and the workmen's careless habit of hammering the iron into place must be objected to, and only allowed where absolutely necessary; that is, only where the pieces cannot be drawn together by other means.

The chord joints should be examined to see if they fit properly, as also should all bearing surfaces. If the lateral bracing is stiff, that is, made up of angles, it is very apt to deflect excessively, a certain amount of which cannot be avoided, but a very slight shop error may give the angle quite a considerable bow or bend, and if this occurs, new ones should be ordered, which may be punched or drilled in the field. Not even the most careful shop work will always ensure good alignment in a stiff lateral system, which does not always have the many advantages that are claimed for it. If, on the other hand, the lateral system is adjustable, the tension in the rods should be tested by the hand or hammer. The same inspection should be given to the counters, and to all adjustable members. The eyebars should also be examined for sags and bends, and the whole adjustment of the bridge carefully gone over. The foundation bolts must be firmly fixed, and it is advisable to have lead or sulphur used for filling the holes instead of cement, which seldom proves as satisfactory. Bridgemen have a great tendency to screw the bolts in the expansion holes as tight as possible; expansion bolts should all be tested to see that they are not too tight to allow a sliding motion, and all other bolts in the structure should be properly checked to prevent their working loose. If any members transmitting a shearing stress are bolted together, and the holes are not satisfactory, they should be reamed out and a larger size bolt substituted, and of course the objections against the excessive drifting of rivet holes in the shop apply equally in the field.

Too much work cannot be done with the transit and level, and in viaducts, trestles, etc., every span and bent should be plumbed, and care taken to see that the successive spans are in alignment and at the proper elevations. The inspector himself should be able to do this work if occasion arises, as mistakes are very apt to occur, and if the work is at all large, and far removed from the engineer's office, it is well to have the requisite instruments on the ground. The inspector should, at any rate, keep a very watchful eye for faults of this description.

The examination of the field rivets will occupy a large portion of the inspector's time, and as this is such a well known and so simple an operation it is needless to dwell upon it farther than stating that where a number of defective or loose rivets are found the fault may lie with the workmen, or it may be that the position is such that it is impossible to drive a tight rivet. Very often, however, the difficulty is due to the use of imperfect tools; the snaps may be worn out, or the dolly-bars may not be heavy enough to hold the rivet up, and the inspector must therefore see that they are sent to the blacksmith whenever it becomes necessary.

If a draw span is under construction great care must be taken in setting the drum and machinery, as absolute accuracy is essential if the bridge is to swing easily, and if the span is reversible the finest work is necessary. It is a good plan to test the center pier by water; that is, by making a little embankment all round with clay or other material and pouring in water to just cover the space, the water showing the uneven spots, if any exist.

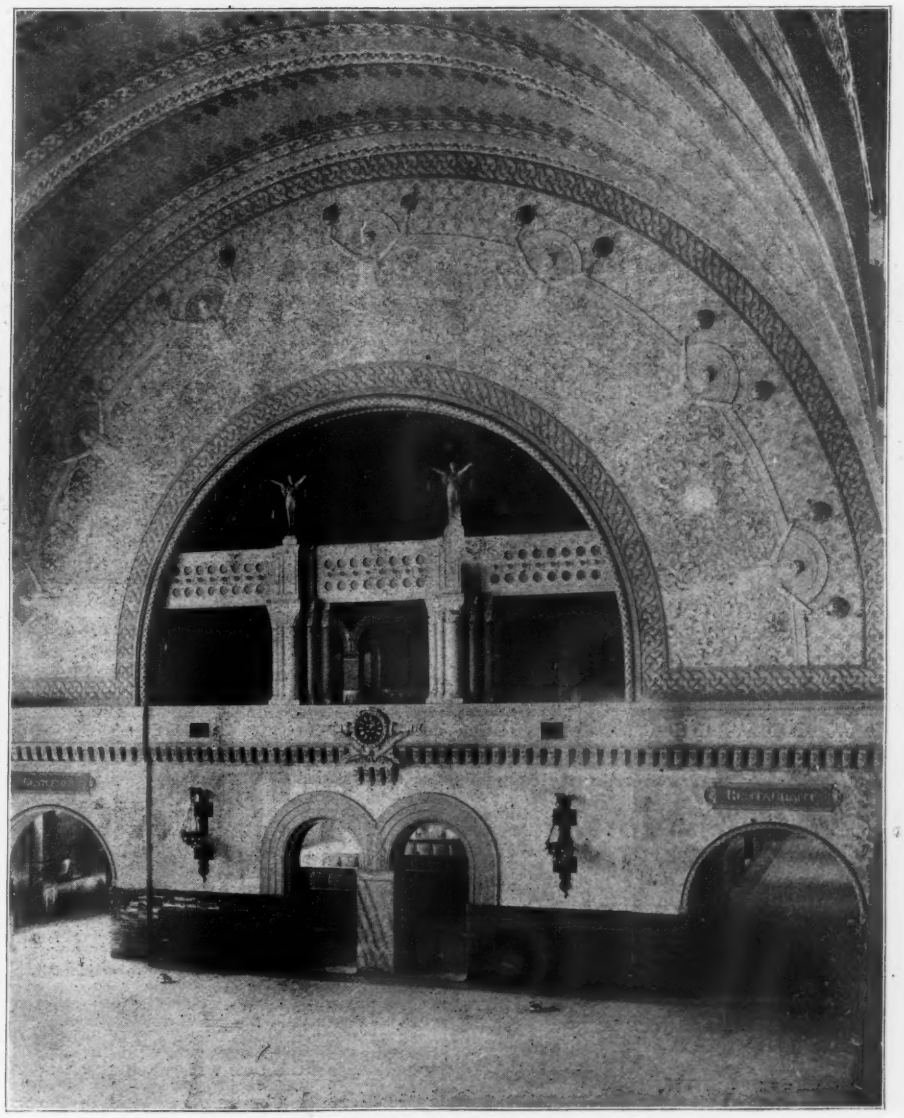
If the span has a rim-bearing turntable the top and bottom track must line to a hair, and the wheels must all be in proper adjustment. If, on the contrary, the span is a center-bearing draw, care should be bestowed on the center rather than the rim, although the latter must not be neglected. The machinery must all be thoroughly oiled, and those parts that are inaccessible or carry great pressure should be lubricated by a mixture of Albany grease and plumbago, which is claimed to retain its properties for a long period.

The painting of the structure is, curiously enough, one of the most likely parts of the work to be neglected. The material very probably has been painted at the bridge shop and loaded while still wet on the cars. During transportation it has naturally accumulated a considerable quantity of cinders and dirt, which, by the time it is erected, has dried in with the paint. If this is the case it should be thoroughly scraped before another coat is allowed to be put on. No painting, of course, should be done in wet or frosty weather.

All the field rivets should be painted as soon as they are inspected. The inspector should watch the mixing of the paint, and see that no turpentine or driers of any kind are added, more than is absolutely necessary to prevent the paint from running. About three-quarters to one pint of turpentine will be found sufficient for a gallon of paint, in the case of red lead. In order to avoid the use of any more turpentine than is absolutely necessary the darkening of the red lead has been effected by the use of graphite ground in oil. If lampblack is used turpentine is required to "cut" it, while the ground graphite mixes readily with the paint oil, and gives a most satisfactory covering. It is certainly a most short-sighted policy to economize in painting bridge work' and there is no doubt that more attention will be given to this in the near future. It is not too much to say that if the field inspector only sees the work properly painted, his time will have been well spent, and if he has attended to all the other matters connected with the work, the railroad management will be more than justified in the expense of the inspection.

HAROLD JEANS.

MARCH, 1895.



End of Grand Hall, Looking West.
St. Louis Union Station.

Train Accidents in the United States in February.

COLLISIONS.

REAR.

7th, on Norfolk & Western, at Bedford, Va., a freight train ran into the rear of a preceding freight, wrecking 5 cars. The engineer was injured.

8th, 3 a. m., on New York Central & Hudson River, at New Hamburg, N. Y., a work train standing at the station was run into at the rear by a following freight, derailing several cars, which fell upon the adjoining main track. A passenger train coming along a moment afterward ran into the wreck and 3 locomotives were derailed altogether, but according to the reports no one was hurt. The freight ran past two danger signals.

8th, on Long Island road, near Morris Park, N. Y., a passenger train stalled in a snowdrift was run into at the rear by a following train; engineer and one pasengers injured.

8th, on Delaware, Lackawanna & Western, at Wood's Corners, N. Y., a passenger train which had been unexpectedly stopped was run into at the rear by a following milk train, badly damaging several cars. Two trainmen and 3 passengers were injured. There was a blinding snowstorm at the time.

9th, on Southern Railway, near Purcellville, Va., an engine sent to the relief of a dead engine, which was stuck in a snowdrift, ran into the latter, making a bad wreck. The engineman was injured.

9th, on New York Central & Hudson River, near Verona, N. Y., a work train stalled in the snow was run into at the rear by a stock train, wrecking several cars. One employee was killed.

10th, on Norfolk & Western, at Pocahontas, Va., a freight train ran over a misplaced switch and into some cars on the side track; a brakeman was injured.

11th, on Boston & Maine, at Dover, N. H., a passenger train ran over a misplaced switch and into a freight train standing on the side track. One trainman was injured.

14th, on Lehigh Valley, near Lehigh Gap, Pa., a freight train ran into the rear of a preceding freight, wrecking the engine and a dozen cars. Four trainmen were injured.

14th, on International & Great Northern, at Dumont, Tex., a freight train pulling into a sidetrack was run into at the rear by a mail train and four cars wrecked. The wreck took fire and five loaded cars were burned up; fireman and one passenger injured. There was a blinding snowstorm at the time, and it is said the flagman of the freight was not seen by the engineman of the mail train.

20th, on Fitchburg road, at Troy, N. Y., a passenger train ran into the rear of a preceding freight, damaging two freight cars; fireman and two passengers injured.

27th, on Atchison, Topeka & Santa Fe, near Las Vegas, N. M., a freight train which had been accidentally stopped was run into at the rear by a following freight, doing considerable damage. The fireman was killed and the engineer was slightly injured.

And 12 others on 11 roads, involving 7 passenger and 14 freight and other trains.

BUTTING.

13th, on Pittsburgh & Castle Shannon, near Pittsburgh, Pa., butting collision of freight trains in a tunnel, wrecking the engine and 25 cars. Five trainmen were injured.

16th, midnight, on Atchison, Topeka & Santa Fe, near Guthrie, Okla., butting collision between a passenger train and a fast freight, making a very bad wreck. The freight engineer and the passenger fireman were killed and eight trainmen and four passengers were injured. It is said that the freight train passed a meeting point contrary to orders.

27th, on Houston, East & West Texas, near Lufkin, Tex., collision between a freight train and a log train, doing slight damage.

A few hours afterward some unknown person seized an engine at Lufkin and ran it into the derailed trains, badly damaging two of the 3 locomotives. The maniac, or whoever it was that started the engine, succeeded in getting off and running away some time before he reached the point of collision.

And 4 others on 4 roads, involving 4 passenger and 4 freight and other trains.

CROSSING & MISCELLANEOUS.

3rd, on New York, Lake Erie & Western, at Susquehanna, Pa., collision between an empty engine and a caboose, wrecking the latter; a brakeman was injured.

11th, on West Shore road, near Palmyra, N. Y., collision between trains 6 and 19, derailing both engines. One employee was injured.

16th, at Pittsburgh, Kan., a freight train of the Missouri Pacific ran into a passenger train of the Atchison-Topeka & Santa Fe at the crossing of the two roads and the passenger cars were overturned. Some of them fell down a bank. The passenger conductor and 8 passengers were injured

18th, on Chicago, Milwaukee & St. Paul, at Milwaukee, Wis., a passenger train being switched in the yards was run violently against a detached passenger car and one passenger injured.

18th, on the Central of New Jersey, at Phillipsburgh, N. J., a passenger train ran over a misplaced switch and into a sidetrack on which stood 4 engines, all of which were badly damaged. Three firemen were injured.

19th, 1:30 a. m., on New York, New Haven & Hartford, at Stamford, Conn., collision of freight trains, due to the fact that one of them approached a junction at uncontrollable speed on a slippery track. A brakeman jumped off and was injured.

27th, on Pennsylvania road, at Roaring Run, Pa., collision of freight trains, blocking the road several hours. One engineman was injured.

And 4 others on 4 roads, involving 1 passenger train and 7 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

3d, on Chicago, Rock Island & Pacific, near Topeka, Kan., a passenger train was derailed by a broken rail and 2 passengers were injured.

3d, on Indiana & Illinois Southern, near Newton, Ill., a freight train with yne passenger car was derailed by a broken rail, and four freight cars and the passenger car fell down a bank. Six passengers were injured.

6th, 4 a. m., on Missouri, Kansas & Texas, at Sayers, Tex., a passenger train was derailed by a broken rail. One passenger and 3 trainmen were injured.

6th, on Chicago, Rock Island & Pacific, near Topeka, Kan., a passenger train was derailed by a broken rail and nearly all the cars were ditched, but did not fall over.

10th, 2 a. m., on Pittsburgh, Cincinnati, Chicago & St. Louis, near Glasgow, O., a passenger train was derailed by a broken rail, every wheel, except two pairs, going off the track. Three passengers were injured.

24th, on New York, New Haven & Hartford, at Providence, R. I., a freight train was derailed by a broken rail and a brakeman was injured.

24th, on New York Central & Hudson River, near Malone, N. Y., a snow-scraper car was derailed by spreading of rails and fell down a bank. The roadmaster was fatally injured and four other employees less severely hurt.

And 13 others on 10 roads, involving 9 passenger and 4 freight and other trains.

DEFECTS OF EQUIPMENT.

23d, on Wilmington & Northern, at Isabella, Pa., a freight train was derailed by a broken axle and 8 cars were wrecked. A brakeman was injured.

And 13 others on 12 roads, involving 4 passenger and 9 freight and other trains.

NEGLIGENCE IN OPERATING.

None causing personal injury; of others there were three, on 3 roads, involving 3 passenger and 2 freight trains.

UNFORESEEN OBSTRUCTIONS.

7th, on Atchison, Topeka & Santa Fe, near Red Rock, Okla., a freight train drawn by two engines was derailed in a snowdrift and 1 engineer and 1 fireman were injured.

8th, on Long Island road, at Averne, N. Y., a passenger train drawn by two engines struck a deep snowdrift and the second engine forced the first one off the track. Both of them were wrecked.

8th, on Philadelphia & Reading, near Allenwood, Pa., a passenger train was derailed and overturned at a frog and 2 employees were injured. The derailment was probably caused by deep snow.

10th, on Philadelphia, Wilmington & Baltimore, near Dover, Del., 3 engines coupled together were derailed in a snowdrift, one of them being overturned. Two trainmen were injured.

10th, on Pontiac, Oxford & Northern, at Cass City, Mich., a passenger train drawn by two engines was derailed in a snowdrift and one engine and a snow plow were badly damaged.

13th, midnight, on Southern Pacific, at Caliente, Cal., a passenger train was derailed by running into a washout and the 2 engines, 2 baggage cars and one mail car were overturned. Both firemen were injured.

19th, 8 p. m., on Northern Pacific, near Bristol, Wash., a freight train was derailed by running into a land slide, and the engine and 6 cars fell into a river; engineer and 2 brakemen injured.

21st, on Southern Pacific, at Franklin, La., a passenger train ran over an unfastened switch and the engine was overturned. The first 2 cars were wrecked and the passenger cars badly damaged. The engineer and fireman were injured, the latter fatally. It is said that the switch lock had been violently removed.

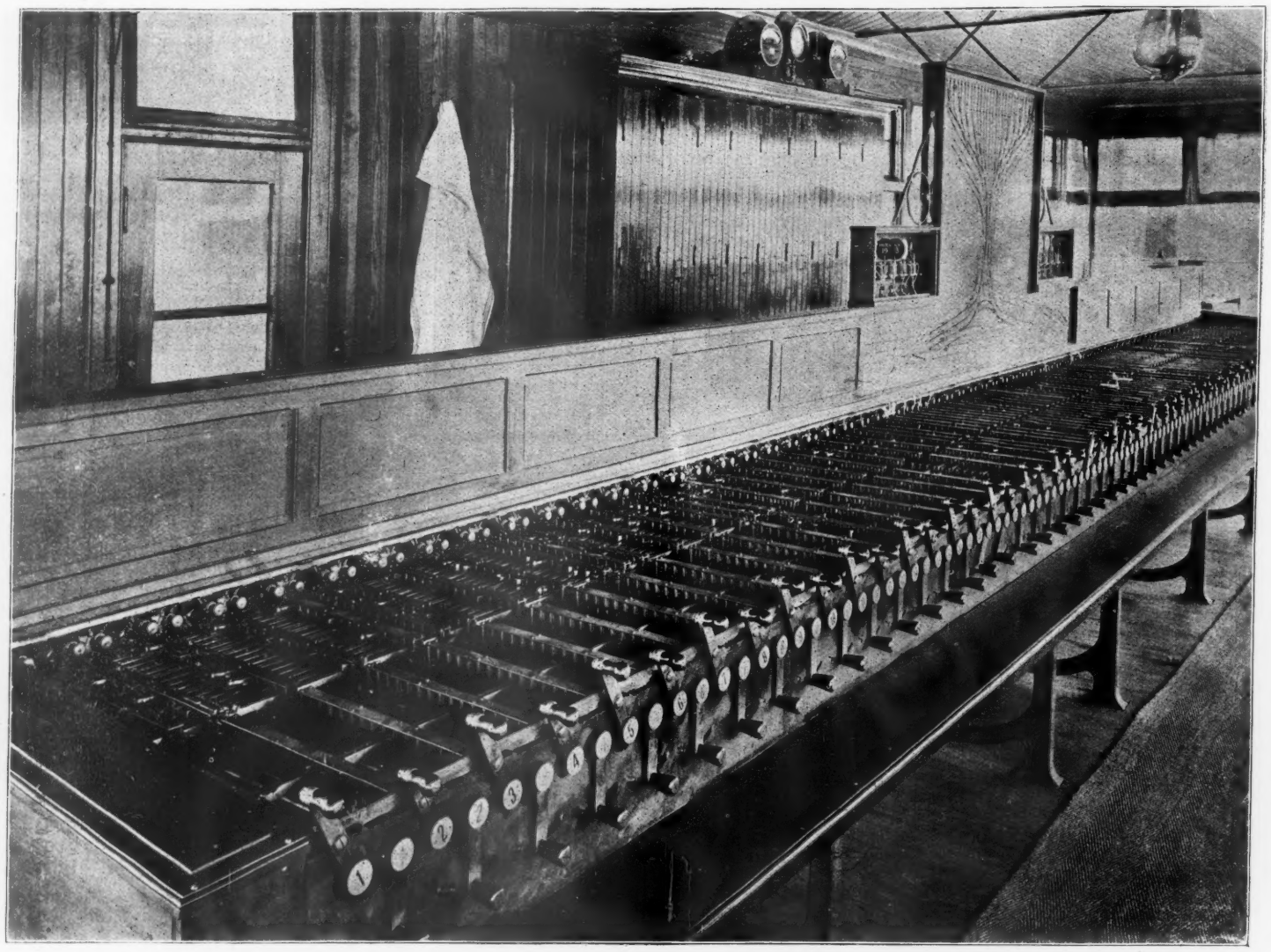
And 8 others on 8 roads, involving 4 passenger and 7 freight and other trains.

UNEXPLAINED.

1st, on Chicago, Burlington & Quincy, at Donnellson, Ia., the caboose of a freight train was derailed and ditched and 2 passengers were injured. The car took fire and was slightly burned.

1st, on West Virginia Central, near Piedmont, W. Va., a freight train was derailed and the engineman was injured.

1st, on Pennsylvania, near Kane Hill, Pa., a freight train was derailed and 20 cars wrecked. Two brakeman were fatally injured.



Electro-Pneumatic Interlocking Machine at St. Louis Union Station.
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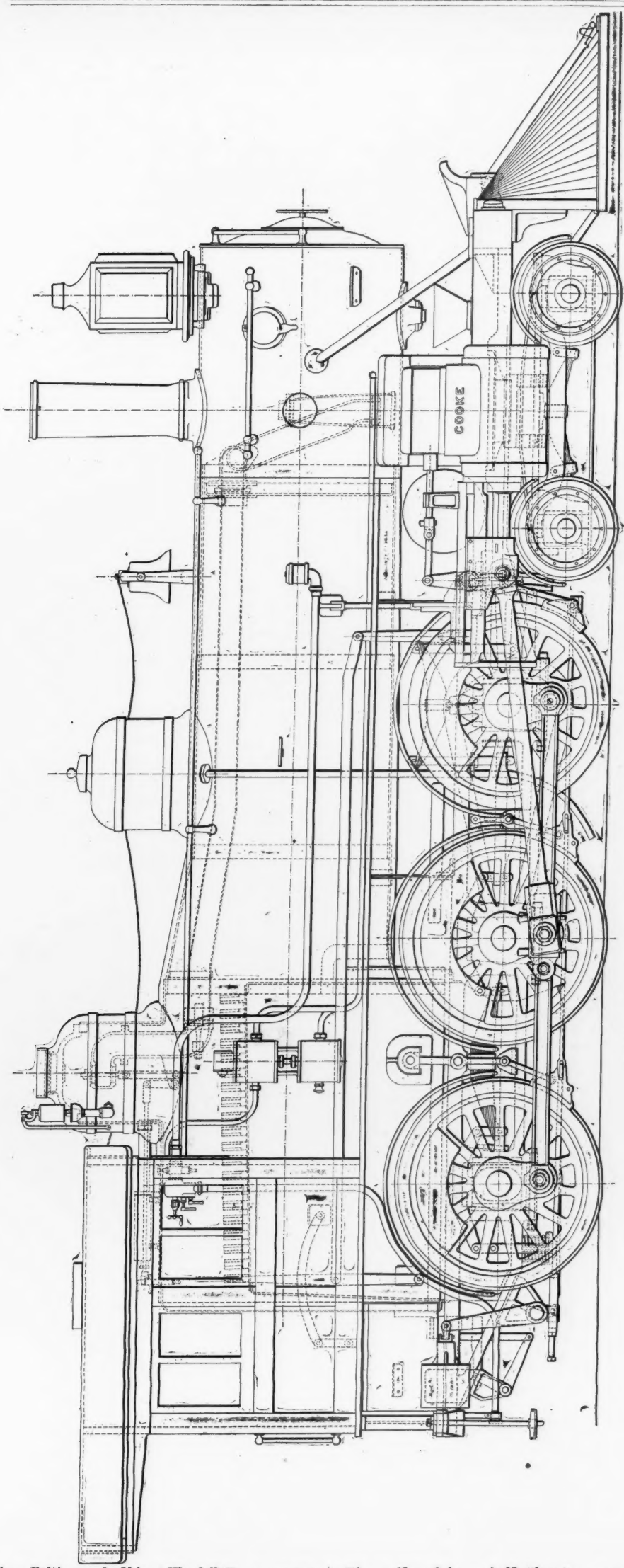


TEN-WHEEL PASSENGER LOCOMOTIVE FOR THE SOUTHERN PACIFIC COMPANY.

Built by the COOKE LOCOMOTIVE & MACHINE COMPANY, *Paterson, N. J.*

2d, on Baltimore & Ohio at Woodell, Pa., a passenger train jumped the track as it was passing the station and several cars fell against a freight train standing on the sidetrack. Two passenger cars were overturned. One trainman was killed and 3 injured.

5th, on Pennsylvania road, near Watsontown, Pa., several cars in a freight train were derailed at a frog. The conductor and 2 trainmen were injured.

7th, on New Orleans & Northeastern, near Purvis Miss., a freight train was derailed and 14 cars were wrecked. Three tramps were fatally injured.

8th, on Pennsylvania road, in the tunnel at Gallitzin, Pa., a freight train was derailed and 3 trainmen were injured.

10th, on Burlington, Cedar Rapids & Northern, at Grundy Center, Ia., a freight train was derailed at a switch, wrecking several cars, including some standing on a sidetrack. A brakeman was killed and 3 trainmen were injured.

15th, 3 a. m., on New York Central & Hudson River, near Rhinecliff, N. Y., a car in a freight train was derailed, wrecking itself and 5 others and blocking both main tracks. A fast mail train ran into the wreck, and its engine and first three cars were derailed. The engine fell into the river, and the engineer and fireman were injured, the former fatally.

15th, on Missouri, Kansas & Texas, near Upton, Tex., a passenger train was derailed on a trestle; the engine was overturned and several cars badly damaged; engineman and one passenger injured.

17th, on Grand Rapids & Indiana, near Kalkaska, Mich., a freight train was derailed, and 6 cars ditched. One brakeman was injured.

19th, on Norfolk & Western, at Ceredo, W. Va., a passenger train was derailed by a defective switch and 2 cars were ditched. One passenger was killed and 2 trainmen injured.

23d, 9 a. m., on Louisville & Nashville, near Greenville, Ala., passenger train No. 1 was derailed and badly wrecked; 2 baggage, 3 passenger and 2 sleeping cars fell down a bank. Sometime after the derailment they caught fire and were burned up. One passenger was killed and 7 injured.

And 26 others on 23 roads, involving 8 passenger and 18 freight and other trains.

OTHER ACCIDENTS.

5th, on Lake Shore & Michigan Southern, near New Carlisle, Ind., several cars in a passenger train were badly damaged by a loose door on a car in a freight train passing on the adjoining main track. Two passengers were injured.

6th, on Norfolk & Western, near Clark, Va., the locomotive of a freight train was wrecked by the explosion of its boiler, and the engineer and fireman were killed.

8th, on West Jersey Railroad, near Millville, N. J., the roof of the baggage car in a passenger train was blown off by high wind.

21st, on New York & New England, near Danbury, Conn., the engine of a freight train was wrecked by the explosion of its boiler. A fireman was injured.

And 4 others on 3 roads, involving 4 passenger trains.

A summary will be found in another column.

Cooke Locomotives For The Southern Pacific.

We have recently noted the fact that the Cooke Locomotive & Machine Co. of Paterson, N. J., is filling an order for 20 ten-wheel locomotives for the Southern Pacific Company. Eight of these have lately been shipped. They are intended for freight and passenger service, the difference between the engines for the two classes of service being simply in the diameter of the driving wheels. The order was placed last November. We give below the dimensions and specifications of these engines.

TEN-WHEEL PASSENGER LOCOMOTIVE.

Gage	4 ft. 8½ in.
Height, top of stack from rail	15 ft. 2⅝ "
" center of boiler from rail	8 ft. 2⅝ "
Weight of engine in working order	140,000 lbs.
" on drivers in working order	106,000 "
" on truck in working order	34,000 "
Total wheel base of engine	22 ft. 8 in.
Rigid wheel base of engine	12 " 2 "
Total wheel base of engine and tender	47 " 9½ "
Cylinders	Simple
" diameter	20 in.
" stroke	26 "
" length of ports	18 "
" width of steam ports	1¾ "
" " of exhaust ports	3 "
Piston	Solid
" packing	3 spring rings
" rod	Steel, 3½ in. diam.
Piston rod packing	Kilborn & Young's
Slide valve	American-Allen
" valve lap	1 in. outside
" valve full travel	5¾ in.
Driving wheels	Six
" " diam. outside tires	63 in.
" " diam. of center	56 "
" " tires, material	Latrobe steel
" " " size	3½ × 5¾, & 3½ × 6¼
Driving axles	Hammered iron
" " diam	7½ in.
" " length of journal	8½ "
Engine truck	Center bearing
" " wheels	30-in. Krupp
" " axles	Hammered iron
" " " diam	5½ in.
" " " length of journal	8⅞ "
Crank pins	Steel
" " main rod journal	5½ in. diam. × 5½ in.
" " side rod journal, middle	5¾ " " × 5 "
" " " " front	4½ " " × 3⅞ "
" " " " back	4½ " " × 3⅞ "
Boiler	Wagon-top; fuel, bituminous coal
" working pressure	180 lbs.
" material, shell	Carnegie steel
" " firebox	Shoenberger steel
" thickness of plates, shell	5/16 in.
" " " side fire-box	½ "
" " " front "	½ "
" " " crown "	⅜ "
" diam. of first course, outside	80⅞ "
" firebox, length	96 "
" " width	42 "
" " depth at back	59 "
" " " front	62 "
" tubes, material	Charcoal iron
" " number	268
" diam., length and thickness	2 in., 12 ft. 5¼ in., No. 12
" crown bars, number	20
" " depth and thickness	6 in. × ¾ in.
Boiler staybolts	1 in. × ⅞ in.
Grate	Rocking finger pattern
Ash pan	Sectional, with dampers
Smokestack	Cast iron, 14-in. diam.
Exhaust pipe	Single

Fittings.

Injectors	One each, Nos. 8 and 9 Monitors
Brake	Combined Westinghouse-American, schedule W. M.
Lubricator	Nathan triple

Engine also equipped with water-brake and Sweeny-brake attachment to Westinghouse system.

Tender.

Frame	Iron
Trucks	Square wrought iron frames
Truck-wheels	Canda, 33-in.
Truck-axles	Hammered iron
Truck-axle journals	4¼-in. diam × 8-in. long
Tank, water capacity	4,000 gals.
Tank, coal capacity	12 tons
Tender, weight loaded	81,000 lbs.

The New Delaware River Bridge of the Pennsylvania.

We give herewith engravings from blue prints of the Pennsylvania Railroad Company's new bridge over the Delaware River at Philadelphia, for which, together with the specifications, we are indebted to Mr. W. H. Brown, Chief Engineer of that road. Fig. 1 shows a general elevation of the bridge, *A* being the draw span. Fig. 2 shows the design of half of the draw span and a cross section of it at the center. Fig. 3 shows details of the regular floor beams and of the center cross girders. The packing of the eye-bars and the details of posts at upper and lower chords are shown in Fig. 4.

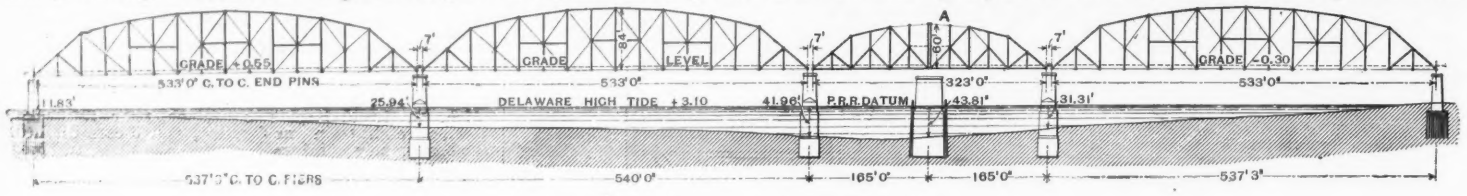


Fig. 1.—General Elevation, Delaware River Bridge.

The superstructure will consist of three through fixed spans and one through draw span, and will be built for double track. Each of the fixed spans is to be 533 ft. in length between centers of bearings, and 31 ft. in width between centers of trusses. The trusses of the fixed spans will be 84 ft. in depth at center, the upper chord being curved, as shown in the engraving. Each of these trusses is to be divided into eight panels of 66 ft. 7½ in. each. The floor will be divided into 16 panels of 33 ft. 3¾ in. each, the intermediate floor beams being suspended from the middle of each panel.

The draw-span will be 330 ft. in length between centers of end bearings; its depth at the center will be 60 ft. and the width between center lines of trusses will be 29 ft. 6 in. Each half of the draw-span will be divided into three panels of 53 ft. 4 in. each in length. The floor will be divided into panels of 26 ft. 8 in. in length with the intermediate floor beams suspended as before. The draw-span will be pivot-bearing and will be provided with wedges under the ends of the center cross girder. The end lift will be designed to produce a reaction of 50 tons at each of the four end bearings. The lifting device will be preferably direct-acting screws; wedges or hydraulic jacks, however, may be used.

The engines for operating the draw-span will be so designed that the end lifts can be drawn and the bridge opened in one minute. The effective horse-power of the engine will be at least 50 per cent. in excess of the net requirements above stated. Bidders upon the draw-span will be required to furnish the engine complete in place with its boiler and all tools and appliances necessary for its operation. They will also be required to furnish the engine-house, a water-tank and coal-box of suitable size in the engine-house and the necessary pumping plant for obtaining water supply from the river for running the engine. The engine-house will be of metal, sheathed on the outside with corrugated galvanized iron, and on the inside with tongued and grooved yellow pine boards.

All material used in the calculated sections of the trusses will be medium steel, while the entire floor system and all rivets will be soft steel. This material will also be used for lattice bars, tie plates and other similar details. The expansion rollers and pins will be of medium steel.

The parts forming the pivot of the draw-span, the circular rack, the track and the gear wheels will all be made of cast steel. This may also be used in the bearings under the fixed spans. Extracts from the specifications follow:

STEEL.

1. All steel must be made by the open-hearth process, and may be either basic or acid, at the discretion of the engineer.

2. If made in an acid furnace, the maximum allowable amount of phosphorus in the finished product shall be eight hundredths of one per cent.

3. If made in a basic furnace, the maximum allowable amount of phosphorus in the finished product shall be five hundredths of one per cent.

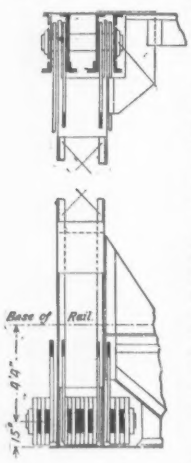


Fig. 1–4.

4. The finished product shall be perfect in all parts and free from irregularities and surface imperfections of all kinds. All steel must be free from piping.

5. No section shall differ by more than 2½ per cent. from that shown on the plans.

6. Every finished plate, bar or angle shall be plainly stamped on one side, near the middle, with a number identifying the melt. Steel for pins shall have the melt numbers stamped on the end. Rivet steel and small pieces, not forming part of the calculated section of members, may be shipped in bundles wired together, with the melt number on a metal tag attached.

TESTS.

7. A sample bar not more than two inches wide, and having in general a sectional area of one square inch, shall be cut from the finished product of every melt. When taken from metal more than two inches thick, the sample may be a turned, round bar. The laboratory tests shall be made on this sample bar in its natural state, without annealing.

8. When a melt is rolled into several varieties of material, each variety shall be separately tested. A variety shall consist of one of the following shapes: Sheared plates, universal mill plates, angles, channels, flats, rounds, pin steel, eye-bar steel.

9. In the laboratory tests, measurements to determine elongation shall be made on a length of eight inches.

10. A piece of each sample bar shall be bent cold 180 degrees and closed up against itself. In no case shall any crack appear until the diameter of the circle around which the bar is bent becomes less than the thickness of the bar. Except in the case of pin steel, the sample bar shall close up on itself without showing any crack or flaw on the outside of the bent portion.

11. The sample bar shall be tested in a lever machine, and shall fulfill the following requirements:

	Ultimate Strength.	Elas'ic Limit.	Elon-gation.	Reducti'n of Area.
Pin steel....	62,000 to 70,000 lbs.	33,000 lbs	17 p.c.	40 p.c.
Medium steel.	62,000 to 70,000 "	33,000 "	22 "	44 "
Soft steel.	50,000 to 60,000 "	28,000 "	26 "	52 "

12. The entire fracture shall be silky.

13. The requirements for elastic limit, elongation and reduction of area are minima, and no steel will be accepted which fails to meet these requirements, except as provided in Section 14.

14. Duplicate tests may be made when the sample tested fulfills four of the five requirements. If the second test and also the average of both tests meet all the requirements, the melt may be accepted.

15. Analyses shall be made showing the amount of phosphorus and carbon in every melt, the drillings for these analyses being taken directly from one of the ingots.

FULL-SIZED EYE-BAR TESTS.

16. The full number of bars of each billed size, and one bar of the same size in excess of the number required for the structure, shall be made at one time. When finished, one bar of each lot shall be selected by the inspector for the full-sized tests. The test bars must be fair average specimens of those which would be classed as good bars, acceptable for the work. No bar which is known to be defective in any way shall be selected for testing.

17. These bars will be required to develop an average stretch of 12 per cent. and a minimum stretch of 10 per cent. before breaking. The elongation to be measured on a length of not less than 25 ft., including the fracture.

18. They shall show an elastic limit of not less than 32,000 lbs. and an ultimate strength of not less than 56,000 lbs. per square inch of section.

19. The specified elongations are minima, and a failure in these requirements will be sufficient cause for condemning the bars represented by the test.

20. In general, bars will be required to break in the body. When a bar breaks in the head, but develops 10 per cent. elongation before breaking, a second bar shall be selected from the same lot. If this bar breaks in the body, and the average elongation of the two bars is not less than 12 per cent., the bars of this lot may be accepted.

21. If more than one-third of all the bars tested break in the head, this shall be deemed sufficient cause for the rejection of the entire bill of eye-bars.

CAST STEEL.

22. Cast steel, when used for wedges, wedge bearings, bolsters or other similar parts of the structure, shall fulfill the following requirements:

23. Every steel casting shall be cast with a coupon for testing, which coupon shall be cut off after annealing, and the test shall be made from a ¾ in. round cut from the coupon. The test piece shall show an ultimate strength of at least 70,000 lbs., an elastic limit of not less than 40,000 lbs., an elongation of at least 15 per cent. in 2 in., and a reduction of area of 20 per cent. at the point of fracture.

24. When the bearing surface of any steel casting is finished there shall be no blow-hole visible exceeding 1 in. in either dimension, nor exceeding ½ sq. in. in area. The length of blow-holes cut by any straight line laid in any direction shall never exceed 1 in. in any 1 ft.

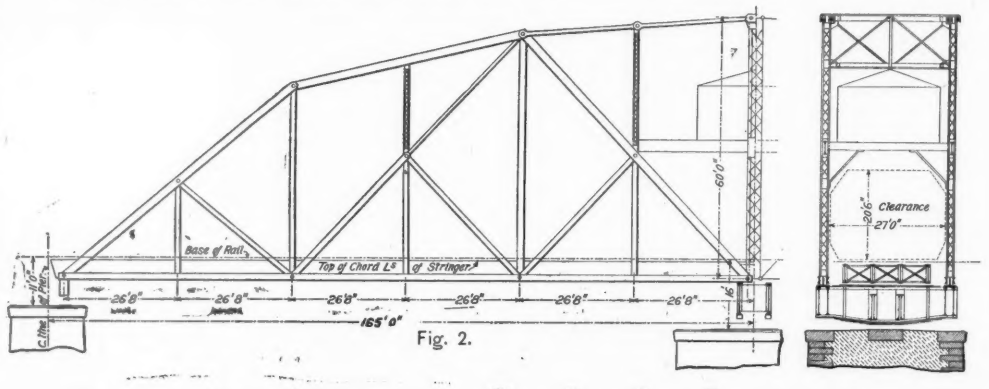


Fig. 2.

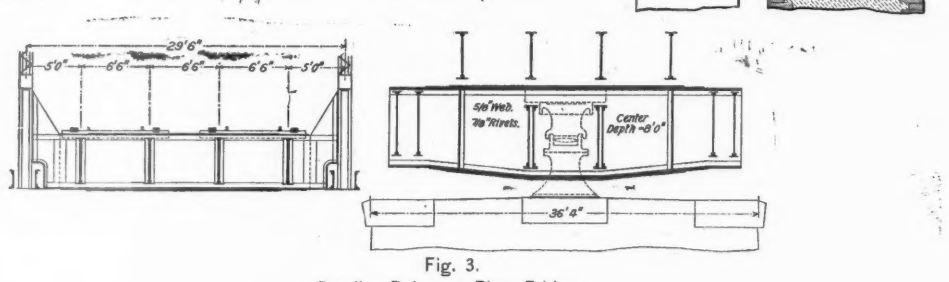


Fig. 3.
Details—Delaware River Bridge.

The Central Railway Club.

The March meeting of this Club was held in Buffalo last week, President Samuel Higgins in the chair. The President spoke of the growth in membership of other clubs, particularly the Western, and urged the heads of the various motive power and car construction departments to make special personal efforts to induce their subordinates to join the Central Club.

Mr. A. M. Waitt, Chairman of the Committee on the Revision of the Constitution, presented a report which will be discussed and acted upon at the April meeting.

Mr. John Mackenzie, Chairman of the Committee on Rules of Interchange, made a report which will also be discussed in April.

CAR DOOR FASTENINGS.

Mr. H. H. Perkins opened the discussion of the report of the Committee on Car Doors and Fastenings which was presented at the January meeting, a synopsis of which was given in the *Railroad Gazette*. He said that the number of box cars in use in the country is about 512,000 aside from those of private owners. It is safe to say that over 200,000 car doors are opened, closed and fastened every day, costing perhaps $500 a day for labor. In practice frequently from 10 to 20 doors must be closed in five minutes, and as but one seal is generally allowed at a station some one has to hustle. The way-freight men want and need a door that will handle easily from the ground or platform. Men have often been hurt trying to open or close a door hung by hooks on a slide bar either at the top or bottom; they are very liable to let go suddenly. When doors hung this way are old they often hang by one corner and there they swing while the car is being switched. The door most satisfactory to freight handlers is hung on rollers at the top with projecting guides below the bottom and wedge-shaped pieces to fill the guides. These work well even when old. Oiling the rollers would be an improvement.

Fastenings should be placed about one-quarter of the distance from the bottom to the top. This permits the seal to be examined conveniently from the ground or platform. Mr. Perkins suggested that instead of the usual hasp and staple a double eye bolt should be used with holes side by side. A hook, secured to the door as the hasp now is, could be made to fit the first hole and a projection from the shank could be extended with a hole to correspond with the second hole in the eye bolt and through these could be used a pad lock or seal wire. As an additional precaution a small hole or slot through that part of the hook below the eye bolt could be made for seal wire or tin strip, which would make a secure way of sealing and easy to examine, and there would be no strain on the wire.

Mr. Waitt said that the door should be so constructed

and secured as to prevent the lower end being pulled open sufficiently for a person to insert his hand and arm and remove small packages.

The President announced the following subjects and and committees for the next meeting:

Management of Steam Heat on Passenger Cars; Is the Use of a Trap Necessary and Advisable? E. D. Bronner, Robert Gunn, John S. Lentz.

Average Life of Flues in Locomotives Working under a Steam Pressure of from 125 to 140 pounds and boilers under from 160 to 200 pounds. A. E. Mitchell, E. A. Miller, P. E. Garrison

Oil for Locomotive Fuel in Southern California.

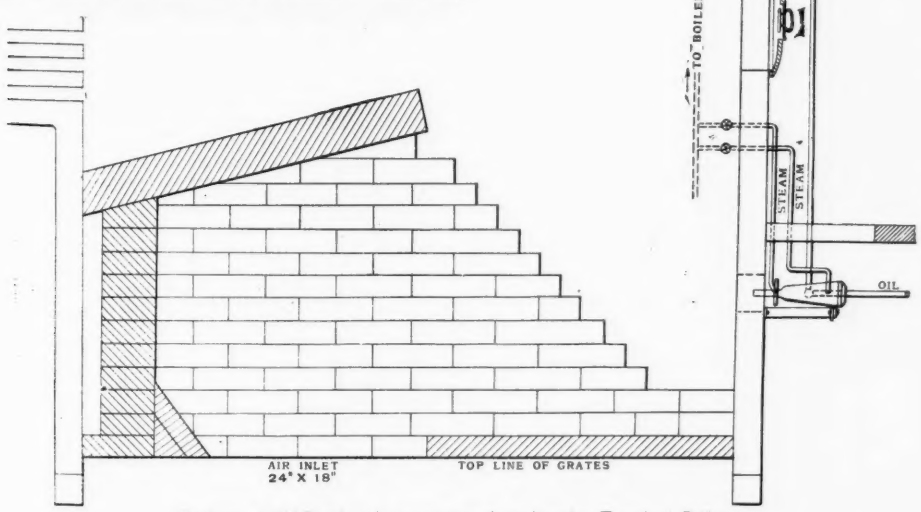
BY MR. GEORGE B. LEIGHTON,
President Los Angeles Terminal Railway.

In localities in which the relative prices of coal and oil are such as to possibly justify a change from coal to oil burning on locomotives, the following highly satisfactory results, obtained from recent experience on the Los Angeles Terminal Railway, may be found of interest. Oil is now found within the city limits of Los Angeles.

A Baldwin eight-wheel passenger engine, of which some of the more pertinent dimensions follow, has been changed from coal to oil burning, with the Holden burner, as used on the Great Eastern Railway of England.

Cylinders	18 in. × 24 in
Driving wheels	60 in.
Fire-box (at grates)	72 in. × 34 in.
Grate surface	17 sq. ft.
Heating surface	1,149 sq. ft.
Number of flues	211
Length of flues	10 ft. 11 in.
Diameter of flues	2 in.
Boiler pressure	150 lbs.
Exhaust nozzles	3¾ in diam.
Weight on drivers	58,700 lbs.
Total weight	92,000 lbs.
Engine and tender (loaded)	162,000 lbs.
Capacity of tank	3,500 gals.

The accompanying drawing will illustrate the alterations made and the devices at present employed. Two Holden burners, placed as shown, and 14 in. apart, are used to atomize and inject the oil into the firebox, which is lined 8 in. thick with fire-brick, in front and



Firebox of Oil-Burning Locomotive—Los Angeles Terminal Railway.

partially on sides, an air space of 2 in. being left between the brake and the sheets to prevent overheating.

A description and detail drawings of this burner will be found in the *Railroad Gazette* of Feb. 26, 1892, page 152. Roughly speaking, it consists of three concentric tubes, the oil passing through the annular space between the outer and middle tubes, and steam from the boiler passing through the like space between the inner and middle tubes (the inner tube carrying air) the steam and oil pass into and through one combining tube, from which they are discharged through two small holes in the end forming two jets for each burner one straight ahead, and one at such an angle with the axis of the burner that it meets the corresponding jet from the other burner about the center of the firebox, the four jets there flaring out and forming a sheet of flame which fills the box horizontally, and impinging against the front brick wall, follows back under the brick arch, and then up over it into the flues. A more intense heat is obtained than with coal, but is so evenly distributed that no objectionable local heating takes place. The bricks in the box become white hot, and retain their heat so that the engine will stand all night (10 to 12 hours) with dampers and smoke stack closed, and retain a pressure of 20 to 30 lbs. of steam in the morning. The oil feed is regulated separately in each burner. One is arranged so that a quarter turn of the wheel shuts off the oil, and the other requires several turns. Thus one burner may be shut off simultaneously with the closing of the throttle, and the other which is left burning during stops, as well as when running, is used, by virtue of its gradual feed, to nicely adjust the supply of oil to the demand, as indicated by the smokestack and steam gage.

The grate surface is floored over with brick, except a rectangular space 24 in. long by 18 in. wide, through which air is admitted. The brick arch is longer than in ordinary practice, and by the proper adjustment of this arch and the grate opening, preventing the incoming cold air from striking against the exposed parts of the sheets, no trouble need be had with leaks, resulting from undue contraction when the oil is temporarily shut off, or turned down, and there is no indication that boiler repairs will be materially increased.

The oil tank is built to fit in the coal space of the tender, and holds a supply of 23¼ barrels of oil (equivalent to about seven tons of coal), the oil being heated by a coil of steam pipes in the bottom of the tank, as more satisfactory working is obtained when the oil is thinly fluid. An air pressure of five to seven pounds per square inch is carried in the tank—this and the heating device being especially necessary in the use of heavy oils—the wire netting and baffle plate are removed from the front end and the nozzles reduced to 3 in.

Following is the cost of making the changes, though these figures may be materially reduced where labor and material are cheaper, and facilities for such work are better:

Material for oil tank	$71.24
Two Holden burners	150.00
Lining brick for firebox	15.25
Miscellaneous pipes and fittings	10.97
Labor and superintendence	107.72
Total	$358 18

An additional expense of $63.50 for 50 barrels of oil, and $35.00 for minor experimental alterations, was incurred in running the engine, in trial service, before putting it on to revenue trains. The engine has been heretofore running in light passenger service between Los Angeles and San Pedro (27 miles) burning Wellington coal (Vancouver Island) costing $7.50 per ton on the coaling track. During experiments extending over a period of two weeks prior to the change, a precisely similar engine, in essentially the same condition and the same service, evaporated 6.2 lbs. of water per pound of coal, from feed water at 60 degs. F., to steam at 150 lbs. pressure (366 degs. F.). Since the change we have burned two different oils; the first, a Santa Paula oil of 24 degs. to 28 degs. Beaumé (7.5 lbs. per gallon) gave an evaporation of from 11.73 lbs. to 12.40 of water per pound of oil, these being the extreme limits. The least favorable of these limits makes 3.3 barrels of oil, costing $4.19, equivalent to a ton of coal, costing $7.50—a saving of 44.1 per cent., while the most favorable gives a saving of 47.2 per. cent. The above is figured at $1.27 per barrel for oil, which it has cost us in small quantites (27 cents being freight charges).

The other oil is a Los Angeles product of from 13.8 degs. to 16 degs. Beaumé (8 lbs. per gal.) which we get for 75 cents per bbl., and which has given an evaporation of 10.31 lbs. of water per pound of oil, which, figured as before, gives a saving of 64.2 per cent.

The approximate accuracy of the above is checked as follows: During runs covering a total of 1,094 miles with Los Angeles oil the cost per mile for fuel has been 11.1 cents, as against an average for the previous year of 28.3 cents for coal. This shows a saving of 60.8 per cent. The difference between these two results may be accounted for by the fact that in the coal-burning service the engine was allowed a slight switching mileage, and in the oil service none has been allowed, and also in oil burning a small percentage of the steam generated is used in the burner and in the steam pipes for heating the oil, this making a slight increase in cost per mile for fuel that the evaporation comparison would not show. Where an engine is worked hard, with heavy trains, or at high speeds, and the waste of coal correspondingly enormous, a still greater saving may of course be had, as combustion of oil is virtually complete, howoever hard the engine may be forced.

Our experience has indicated that the best results are obtained when thin, grey smoke is allowed to issue from the stack, as when the stack is entirely cleared it is accomplished by admitting an excess of air over the amount required for combustion, involving danger of chilling the boiler; while, on the other hand, if too little air is used, and black smoke issues from the stack, carbon and the heavier constituents of the oil will deposit unburned in the flues. While standing over night the oil is turned on once, or perhaps twice, in order to keep up sufficient steam to run the burners, and when firing up a cold boiler (which may be done in much less time than is required for coal), the steampipe leading to the burner is connected to a stationary boiler in the round house, which provides the burners with steam. Foremen become proficient with very little experience, the main requisite being extreme care in preventing the firebox from being cooled by using too much air or too little oil. One important fact is that with this plan a heavier oil is being used than has been used elsewhere, and therefore oil is used from oil wells that have no other customers.

We have also two engines fitted with the Baldwin burner, which seems to give equally good service. The working tests are for a less period, the engines having been more recently converted and so similar to the work of the Holden burner that it does not seem necessary to describe the work further. The reader is referred to the *Railroad Gazette* of Feb. 8, 1895, page 82, for a description of this burner, the chief difference between it and the Holden being that the Baldwin burner is inserted under the mud-ring, requiring no cutting of the water leg. It is much cheaper in first cost and cost of application. The Holden burner, however, has given rather better results upon our large 10-wheel engines.

Great credit is due to our Master mechanic, T. R. Shanks, for his efficient work in coverting the engines to enable them to use the heavy Los Angeles oil, and to his watchfulness when first put in service in adapting the lining of fire brick to give the best results. No superheating of flues or sheets has at any time occurred. To his assistant, Mr. H. S. McKee, is due the credit of the office work and the careful watch on all measurements to give the accurate figures here given.

Railroad Legislation in Maine.

The Legislature of Maine, which has recently ad journed, passed a number of laws affecting railroads. We copy from the *Lewiston Journal*, which issued a special edition giving all the laws in full, the following paragraphs epitomizing these statutes, including also two or three which have only a local application.

An act to enable Washington County to loan its credit to the Washington County Railroad was passed, and the charter of the Shore Line Railroad was allowed to die. The Washington County Railroad charter has been extended four years.

All horse railroads are to be known as street railroads for the purposes of taxation, which shall be upon all at the same rate as heretofore upon horse railroads.

An addition has been made to the Revised Statutes relating to malicious mischief so that whoever breaks and enters any railroad car, destroys, injures, defiles or defaces any railroad car, or mischieviously or maliciously releases the brakes upon, moves or sets in motion any railroad car, etc., shall be imprisoned for a time not exceeding two years or be punished by a fine not exceeding $500.

All railroads have been authorized to operate their lines by electricity.

The railroad commissioners have been given power to determine the manner and conditions of one railroad crossing another. The commissioners shall determine how bridges erected by any municipality, over which a railroad passes, shall be constructed and maintained as to safety.

The county of Aroostook has been empowered to invest in the Bangor & Aroostook Railroad to an amount not exceeding $228,000, and the second mortgage made by the company has been ratified and confirmed.

The railroad commissioners are given the power of approval on the location of street railroads.

A person whose building or property is injured by fire communicated from a locomotive cannot now collect damages from the railroad company and also receive insurance on the same.

Interlocking for an Electric Crossing.

The drawings given herewith show the manner in which the National Switch & Signal Co. has equipped a crossing of the Chesapeake & Ohio at Catlettsburg, Ky., to protect the C. & O. trains from the danger of running into electric street cars, and to protect the latter from the steam locomotive.

The main idea in designing this interlocking was to provide complete safety at the least expense, and the arrangement is such that a regular attendant need not be employed. The conductor of the street car is to leave his car before it enters upon the crossing, and go into the

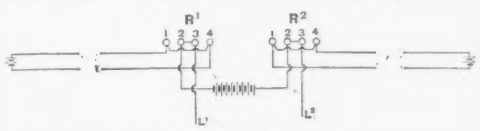


Fig. 2.—Track Circuits.

cabin and set the signals on the Chesapeake & Ohio at danger. After proceeding thus far he finds himself locked into the cabin. He then sets the signal for his own car to cross; and he must replace this at danger and set the Chesapeake & Ohio signals at all-clear before he can open the door to go out.

The arrangement of tracks is shown in Fig. 4, the letters r^1 and r^2 indicating the electrical connection with the relays. The home signals, 2 and 7, are located about 300 ft. from the crossing, and the distant signals, 1 and 8, about 1,500 ft. from the home signals. There are derailing switches 5, 5, in the street track, but none in the tracks of the standard railroad. The street signals 3, 3, are

dwarfs, though they may be placed on high posts where desired. These, as well as the derailing switches and all the other signals, are connected with the levers in the tower in the usual manner. Ordinarily the railroad signals 1, 2, 7 and 8 are left at all-clear, and the others at danger, with the derailing switches open.

A section of the interlocking is shown in fig. 1. To provide against carelessness on the part of the conductor of the electric car the levers are so interlocked that he cannot clear No. 1 until he has cleared 2, 7 and 8; and he cannot open the door to go out until he has cleared No. 1. Besides this the home signals are locked at clear and the street signals at danger by a track circuit when an approching train passes the distant signal. The arrangement of the track circuits is shown in fig. 2, in which R^1 and R^2 represent the relay points, and L^1 and L^2 lead to the lock magnet. It will be seen that both tracks must be clear of trains (from the distant signal to and beyond the crossing), in order to close the circuit through the lock magnet, so as to unlock lever 2 and permit the street signals to be cleared. The arrangement of the lock magnet is shown in fig. 3. When, in consequence of the presence of a train inside the distant signal, on either track, either one of the relays is open, the lock magnet is open and the counterweight, *C*, attached to the armature, falls, thrusting the plunger into the hole in the tappet of the interlocking machine. This hole is shown at *H* on tappet No. 2 in fig. 1. The similar hole at *A*, fig. 1, is for a plunger operated by a lever connected with the door of the cabin, this being the method of locking lever No. 1, referred to above.

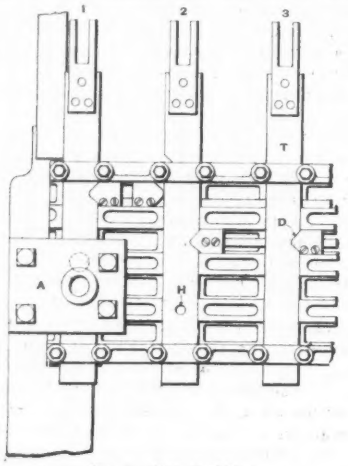


Fig. 1.—Interlocking.

In the operation of the signals for the passage of a street car the operator puts levers 1, 2, 7 and 8 to danger. The movement of lever 1, which must be made first, shifts the hole *A* so that the plunger cannot enter it, and this keeps the cabin door closed. When the four levers have been put to the danger position 3 and 5 are unlocked so that the man can close the derailing switches and clear the signals for his own car. After the car has passed over he replaces 3 and 5 and clears 1, 2, 7 and 8. As before stated the home and distant signals 1, 2, 7 and 8 are so interlocked that all of them must be cleared in proper sequence, 1 being cleared last; and with lever 1 thus reversed the hole *A* registers with the plunger operated by the door and the operator is free to leave the tower.

If the conductor attempts to set signal 2 or 7 at danger when a train is approaching it he finds it locked by the electric lock, lever 7 in the clear position being locked by lever 2 in the clear position.

The apparatus for locking the lever by means of the door has been patented and a patent has been applied for on the electric lock.

A plant of this kind has also been ordered by the Toledo, St Louis & Kansas City road for Alhambra, Ill.

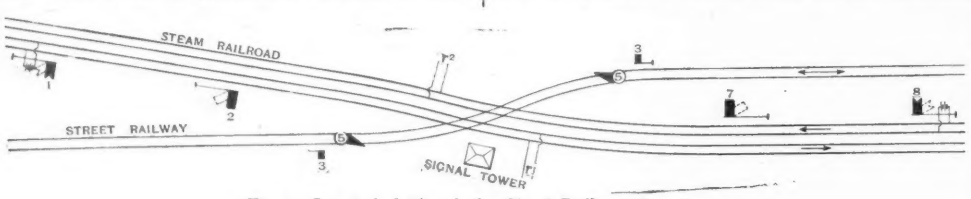


Fig. 4.—Interlocked Signals for Street Railway Crossing.

Preservation of Ties in France.*

In a recent issue of the Revue Générale des Chemins de Fer, Mr. Euverte, an officer of the Paris, Lyons & Mediterranean system, gives a pretty comprehensive study of the methods of treating cross ties which are greatly used in France. The subject is presented with that elegance of arrangement that we expect in French scientific writing, but in the abstract which follows we shall cut it down a great deal and depart somewhat from the author's arrangement.

These primary conditions are laid down as necessary to the utility of an antiseptic employed. It must be liquid at the moment of injection, and it must be cheap enough for practical use. Sulphate of copper, chloride of zinc and creosote fill these conditions and are all used. Sulphate of copper, however, has to-day but little use, although it is cheap enough. The P., L. & M. Co. used it until 1875, and there it cost 11.4 cents † per tie. Of this 6.2 cents was for the sulphate itself. Each tie received from 52.8 to 70.4 lbs. of a solution, which solution contained 33 lbs. of sulphate of copper to every 260 gals. of water; that is, each tie was treated with 1.03 lbs. of sulphate of copper. The antiseptic dose was feeble, the sulphate was partially washed out by humidity, and it caused rapid corrosion of the rail fastenings.

Chloride of zinc is much used in Germany, Austria and Russia. It is used in a solution of 2 to 3 per cent. For oak ties, 9.51 quarts of the solution, that is, .4 lbs. of the salt, are used per tie. For pine about 1.10 to 1.65 lbs. of chloride of zinc is used per tie in Denmark. This treatment is still cheaper than that by sulphate of copper, but it has the same drawback with regard to solubility in water.

Creosote has long been used in England, France, Belgium, Austria and Portugal. It is relatively cheap when its antiseptic qualities are taken into account and its naphthaline is insoluble. On the French state railroads, an antiseptic mixture of creosote and chloride of zinc is employed, being 8 gallons of chloride and 10.4 gallons of creosote to every 260 gallons of water. The wood is treated to saturation.

With this brief examination of the various methods, Mr. Euverte proceeds with his particular account of creosote and its uses. The general name of creosote applies to one of the products of distillation of coal tar containing a certain proportion of antiseptic products. Of course, other tars yield creosote, and wood tar would be particularly useful for preservation if the price was not too high, for it is rich in antiseptic phenols. The chief source of coal tar is from illuminating gas works and from coke works, but the first source is very much the more important as the coke works are not often arranged to save the tar. It is believed that by a change in this matter in the French coke works all the creosote necessary could be produced in that country without importation. In the French experience about 5 per cent. of the coal is returned in tar in the manufacture of gas and about 2 per cent. in making coke. After distillation at the gas works, the heavy oils are delivered directly to the railroad companies for creosoting. This heavy oil or creosote, as it is called when used as a wood preservative, should have a minimum of 10 per cent. and a maximum of 30 per cent. of naphthaline and as much as possible of phenols, say up to 10 per cent. It is well to be sure that your creosote contains these proportions of these elements, for there is considerable temptation to extract the phenols which are now useful, in France at any rate, in making nitric acid explosives and naphthaline, which has various industrial uses.

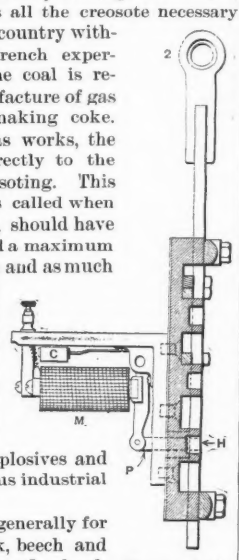


Fig. 3.—Lock Magnet.

The French companies use generally for ties three different woods—oak, beech and pine. Exceptionally they use fir, larch and chestnut. Heart oak may be used without treatment, but when it has much sapwood it soon rots and should be injected.

Ties of heart oak will absorb but small quantities of creosote. Oak ties with more or less sapwood absorb from 5.2 to 7.39 quarts of creosote. The beech and pine ties take up about 26 quarts before they are saturated, but the process is usually stopped before that point is reached. The quantities of creosote as adopted by the different demonstrations are, as below, in pounds per tie:

Oak	11 to 15.4 lbs.
Beech, Northern System	28.6 "
Western	33 to 35.2 "
P., L. & M.	35 2 "
Eastern	52.8 "
Pine, Southern System	26 4 "
Orleans	30 8 "
P., L. & M.	26.4 "

The Eastern, Southern and Orleans companies buy their ties creosoted or have them creosoted by contractors. The Lyons Co. and the Northern buy a part of their ties creosoted and treat the rest in their own works, of which the P., L. & M. has two and the Northern one. The P., L. & M. Co. can treat 600,000 ties a year, and, if need be, 800,000. The Northern generally treats from 250,000 to 300,000. The Eastern Co. treats all of its own ties in two works, one of which alone turns out about 400,000 ties a year, and may turn out 500,000.

The Northern Co. employs at its works at Villers-Cotterets a special process, a modification of the old Blythe system. The timber is first steamed in a reservoir containing creosote, then the products of condensation are drawn off and the heavy oil is collected for use again. The cylinder is then filled with creosote and subjected to pressure by steam, and a dose of about 6.6 lbs. per tie forced into the beechwood. At these works there are 9 cylinders, each of which will take in about 25 ties and about 1,000 ties are turned out per day.

The companies generally use stationary cylinders, while the contractors more generally employ portable cylinders. In the first the ties are run in on trucks, the trucks being handled either by hand or by capstans. In the second system the cylinders open at the middle and each of the two halves can be rolled to the place where the ties are piled. The system using stationary cylinders has the advantage of economy of time in loading, while the movable cylinders admit of less costly plant. The cylinders used vary in length. They are generally from two to four times the length of a tie; that is, from 19.7 to 39.4 ft. Their diameter is generally from 5.2 ft. to 5.9 ft. The operation of filling the cylinders with ties, carrying out the process of injection, and then taking the ties out, is found to take 75 minutes, on the average, for stationary cylinders. For the portable cylinders, the average time at the different works varies from 105 to 125 minutes.

In the early days of treatment the aim was to treat the wood near the forest where it was cut, and small and portable plants were common. Generally it is found more advantageous to build larger and permanent plants. These are placed near the forest regions. Thus, the Northern Co. has established its works at Villers-Cotterets, the Lyons at Collognes and the Eastern at Amagne. The additional transportation of the ties necessitated by taking them to the works is estimated to cost about six cents per tie. In order to minimize this the P., L. & M. Co. has established two works, one for its Northern and one for the Central portion of its system, not counting the works of the contractors.

Much attention is paid in France to the seasoning of the ties before treatment. The time that they are left piled, to season varies from six months to a year, according to the climate, the prevailing winds, etc. Therefore, the treating plant should have land available for piling a good many ties. Various methods of piling are adopted, but generally the aim is to pile the ties so loosely that the air can circulate freely and to arrange the piles with regard to the prevailing direction of the winds. In some cases ties are kiln dried. For instance, at the Amagne works of the Eastern Co., all ties are kiln dried, probably for the reason that the climate of the region is comparatively damp and cold. It is estimated that oak ties lose about 15 per cent. of their weight after 18 months' seasoning in the open air, and then about 1.6 per cent. in kiln drying for a period of 144 hours. For beech the average figures are rather different. After three months' seasoning in the open air these ties will have lost about 7 per cent. of their weight. They are then kiln dried for 72 hours and lose 4 per cent. more. Kiln drying is used more or less by the Northern Co. at its Collognes establishment. The author estimates the cost of kiln drying at from 0.6 to 1.0 cent. per tie.

It is customary at the French works to face the ties for the reception of the rail or chair by machines devised for that purpose, which is a great saving over the old method of doing this by hand.

The cost of treatment of oak ties is put down at 8 cents per tie for creosote and 4.4 cents for other expenses at the Collognes works. For beech or pine the creosote cost is considerably more, namely, 22.4 cents on the P., L. & M., and 34 cents on the Eastern, which company uses a great deal more creosote. We may say, then, that the oak ties will cost for treatment 12.4 cents and the beech or pine ties from 26.8 to 38 cents, although the author thinks that 4 cents should be subtracted from these figures. The extra cost for transportation is of course quite variable.

Of course the gain in life of ties is the most important of the questions to be considered. The P., L. & M. Co. substituted creosoting for the treatment of sulphate of copper in 1876, for beech ties or oak sapwood ties, which represented about one-fifth of the ties used. The average life of those taken out of the track in the years 1881, '82 and '83 had been 9.8 years. From the latter date the life of the ties grew steadily, and in 1893 it had reached 13.4 years; but this life is still growing as the old ties disappear and as the percentage of treated ties increases, and it may be expected to grow much higher.

A non-treated oak tie costs 90 cents near the point where it is cut. After treatment it costs $1.08, an increase of 20 per cent. The beech tie, not injected, costs 60 cents; creosoted it costs 92 cents. On the P., L. & M. the life is seen to have increased 37 per cent., while 4 per cent. of the ties were creosoted. Observations were made on trial sections on the Eastern system, which indicated an increase of 65 per cent. in the life of treated ties, and on two trial sections on the P., L. & M. the observations led to the belief that the ties would live from 21 to 24 years, where the life of ties treated by sulphate of copper was only 13.7 years.

At present about half the creosote used on the French roads is imported. France exports annually about 850,000 ties, most of which are creosoted before shipping and are imported from Bordeaux to Spanish and Portuguese ports.

The Mozier Three-Position Semaphore.

The Mozier Safety Signal Co., of Cleveland, is issuing a new catalogue, from which we take the accompanying engraving of the latest design of the company's three-position semaphore with a hollow post.

The company makes these signals, with solid posts,

*For an excellent account of the method of preservative treatment of timber on the Southern Pacific, see the *Railroad Gazette* of Feb. 8, 1895.

† In transforming from the French systems, a franc has been taken as 20 cents.

but recommends the hollow post as especially desirable on account of the convenient disposition of the lamp, which, as will be seen by the engraving, is placed in the post through an opening at the bottom, and is then lifted to its position by a chain running around a pulley at the top.

The peculiarity of this signal is the arrangement for showing three indications by three different positions of the arm, while at the same time the counterweight holds the arm normally in the horizontal or danger position. In the figure shown it will be seen that the castings containing the colored glasses are attached to the right hand arm, *G* indicating the green glass and *R* the red. *X* indicates one of the spectacles (on the other side of the post, as viewed by the observer) belonging to the left hand arm, which is for trains running in the opposite direction. The counterweight, *W*, is made Ω-shape and is guided by the pins in the center and transverse band. By means of the two chains attached at either side of the center of the bearing on which the signal arm turns, the weight returns the latter to the normal position from either the safety or the precaution position.

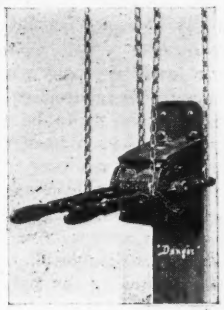


Fig. 2.—Mozier Safety Signal Levers.

In connection with this signal the manufacturers use the Mozier levers, as indicated at *A*, *B*, *H* in the cut. This lever, which is shown more clearly in the perspective view, Fig. 2, always stands in a position corresponding to that of the arm which it controls; when in the caution position the arm stands, as shown at *A*, and when in the clear position as shown at *B*. The lever can be locked in either one of these two positions, but when it is thus locked it automatically cuts out the telegraph keys of the office so that the operator cannot receive a train order, or, in fact, communicate by telegraph in any way, although he can hear calls or any other communication going on upon the wire, as his relay is not cut out. By this arrangement an operator is compelled to see that his train order signal is in the danger position, so as to stop all trains, before he takes his mind off from it for the purpose of attending to a train order.

These signals are in use now on the New York, Pennsylvania & Ohio, the Chicago & Erie, the Chicago, Rock Island & Pacific, and the Cleveland, Akron & Columbus, aggregating about 1,000 miles of road and nearly 300 signals. Railroad officers using them are reported as being highly satisfied with their behavior. The use of an upward inclined position for the caution indication is peculiar to this signal. After four years' experience, the makers state that this method of giving a caution indication is highly satisfactory.

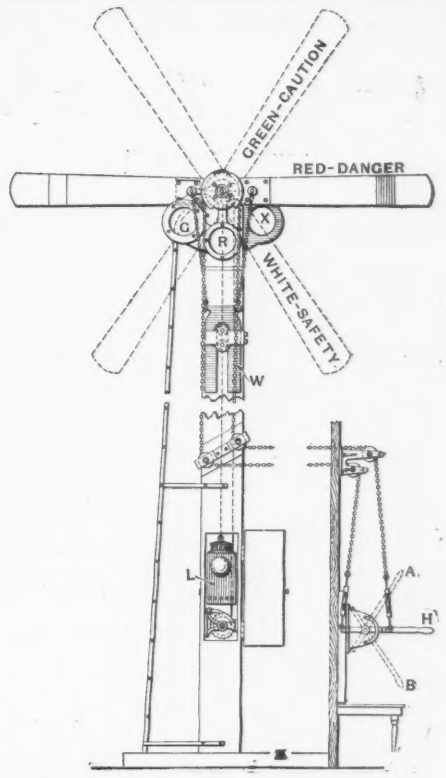
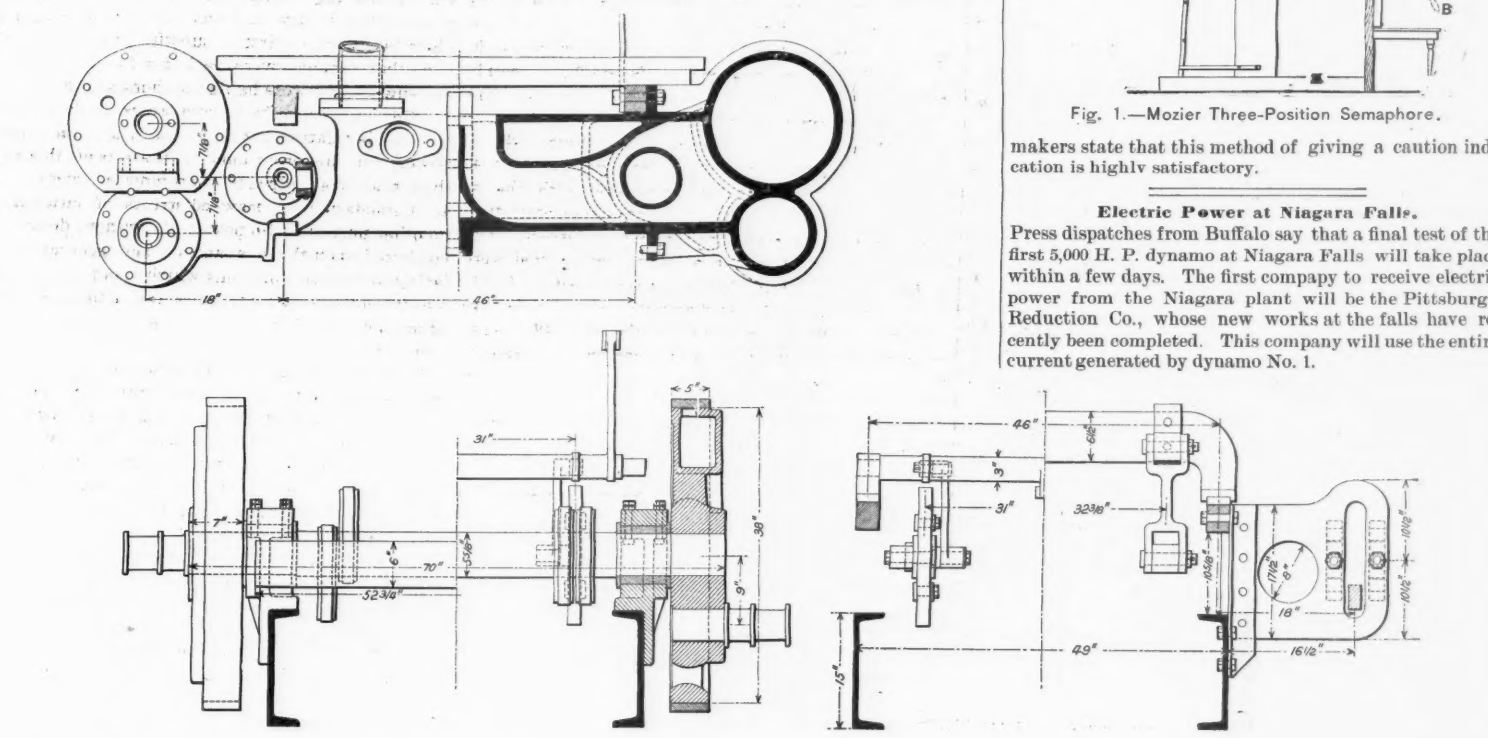


Fig. 1.—Mozier Three-Position Semaphore.

Electric Power at Niagara Falls.

Press dispatches from Buffalo say that a final test of the first 5,000 H. P. dynamo at Niagara Falls will take place within a few days. The first compapy to receive electric power from the Niagara plant will be the Pittsburgh Reduction Co., whose new works at the falls have recently been completed. This company will use the entire current generated by dynamo No. 1.



Model of a Baldwin Compound Locomotive for Purdue University.

Note.—The engravings show in detail a model illustrating the principles of the Baldwin Compound Locomotive. This model was built for the laboratory of Purdue University and presented to that institution by the Baldwin Locomotive Works. The engravings give all the information that we have concerning it.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.

Published Every Friday

At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The predictions of Chicago observers, after the adjournment of Congress, that eastbound freight rates would go to smash within a short time, have been abundantly verified, and the press dispatches on this subject during the past week have been nothing but a series of reports of cuts in grain and provisions, each succeeding cut being worse than the previous ones. On Monday the Chicago & Grand Trunk is said to have made a rate of 12 cents per 100 lbs. on oats, and the reporters say that the Michigan Central followed it, the two together taking contracts for 600,000 to 800,000 bushels. This rate means 14 cents to Boston and 9 cents to Baltimore, which, as everyone knows, must be far below cost. The wording of the dispatches indicates that this rate was an open and legal one, though we have not yet seen the announcement of a similar reduction by any of the other lines. Shipments from Chicago last week amounted to 60,553 tons, of which probably half consisted of goods taken through to the seaboard at reduced rates. There is no more reason for this desperate strife at this time than there has been for the past year, so it must be concluded that up to the time they gave up hope of Congressional action the traffic managers were in some degree restrained by the prospect of relief by means of pools. No one seems to have any confidence in anything short of a money pool. The trouble might at least be mitigated by an agreement on percentages, and the temporary withdrawal of soliciting agents by roads that overran their allotment, but the confidence of the roads in each other's trustworthiness seems to have fallen so low that no such scheme is proposed. The sensational correspondents talk as though one or more railroads had "refused" freight and had quickly abandoned that course because it made enemies of shippers; but this can be set down as a pure fabrication. The Trunk Line presidents were to meet in New York on Wednesday, but whether they will take any measures to restrain their reckless Western dependencies remains to be seen.

The Anthracite Coal Situation.

The coal companies have been endeavoring since the middle of last November to agree upon some basis of operation for 1895, but it was not until last week that any decided progress was made. Up to that time subordinate officials had held numerous meetings, collected valuable data, and having thus fulfilled their instructions, referred the matter to the presidents and adjourned sine die.

The issue is the allotment of the business between 11 shipping interests. The proportions which the different companies considered themselves entitled to aggregated considerably over 100 per cent. This rendered some readjustment necessary. A long delay, accompanied by great uncertainty as to the future demoralized the market and established prices only a few shillings per ton above the figures recorded in the auction sales of 1877.

This was the condition of the trade when the presidents held their meeting two weeks ago. They failed to take definite action but appointed a committee with instructions to report in one week. The sentiment of the various representatives was unanimous in favor of harmony. This was regarded as most encouraging and established the belief that a settlement would finally be reached. At the subsequent meeting last Thursday, distinct and satisfactory progress was made. The session occupied five hours and was devoted to a consideration of a report of the committee, which was to the effect that the operations during 1895 should be on a basis of those of 1894.

There was a surprising unanimity of expression in favor of the adoption of this plan. There were two dissenting interests, viz., Lehigh Valley and New York, Susquehanna & Western. The latter desired a fraction of one per cent. increase, holding that its increased facilities, viz., the Palisade tunnel and the Wilkesbarre & Eastern entitled it to a larger share of the coal trade. It is thought that the company's claim can be adjusted without difficulty at the proper time. The position taken by the Lehigh Valley will also have consideration. That company mined but 146 days during 1894, while the average days mined by all the companies was 169.9 days. To accept an allotment based upon operations so much less than the average, the company claims, would be unfair. The entire matter was referred back to the committee to report a basis, or if impossible to do so, to report demands made by the various interests. It is now in the hands of this committee, and will probably be laid before the presidents within a week.

There has been a little change in the figures showing the shipments of the various intesests during 1894, now before the committee, as compared with the returns made by the Bureau of Anthracite Statistics. However, the latter are approximately correct. The percentages of each company during this period were as follows: Reading, 20.02; Lehigh Valley, 15.52; Jersey Central, 11.71; Lackawanna, 14.49; Delaware & Hudson, 9.65; Pennsylvania Railroad, 11.42; Pennsylvania Coal, 4.12; Erie, 4.03; Ontario & Western, 3.31; Coxe Bros., 3.94; Susquehanna & Western, 1.79.

Susquehanna's tonnage for the first part of the year was figured in with that of Lackawanna, as the company did not control its terminals until mid-summer. Its actual operations were, therefore, considerably greater than 1.79. It claims 3.5 per cent. as its share of the 1895 business.

The most surprising development of the President's meeting was the expressed willingness of Reading to continue with 20.02 per cent. of the total. The friends of that company have all along maintained that it would insist upon a material increase.

The idea of the managers of the trade seems to be peace, and the general policy, such co-operation as will permit of the limited tonnage at a fair price rather than a large tonnage at a low price. The prospects of complete co-operation are now bright. An agreement would immediately have the effect of advancing the coal some 40 cents per ton to a basis of $3.40 net for stove, and a maintenance of the new figures until the fall demand sets in.

The Right of the Electric Railroad on the Highway.

We noticed very briefly last week, page 198, the important decision read by Justice Williams, of the Supreme Court of Pennsylvania, affecting the rights of electric railroads on public highways. After that issue went to press we received the full text of the decision, which is a very important step in the progressive development of the law governing the powers and rights of railroads, using other motive power than animals, to enter upon and occupy highways and country roads. It must have been obvious for a good while to everybody who has thought at all about the matter that the law in this particular is still in a formative stage, as must necessarily be the case, for the art and practice is itself still in a formative stage.

As matters stand now, a steam railroad (and steam railroads are still essentially the only railroads outside of the city and the suburban zone) must pay for its right-of-way, the possession of which it acquires in fee. If it can make a bargain with the owner, well and good; if not, it can, by the right of eminent domain, take possession of a right-of-way, provision being made, by bargain or condemnation, for paying the owner an equitable amount.

On the other hand, the street railroads, which as a consequence of the sudden development of the use of electricity as a motive power, are reaching out further and further from the cities and towns and beginning to cover the country districts (with projects at least, if not with actual constructions) have acquired their right-of-way on the public roads by the consent of public officers and at no cost other than the expenses of promotion.

The results are anomalous, and in many cases inequitable. The property holder along the line of a highway suddenly finds his rights invaded with no compensation whatever. The officers of his township have given away to a corporation some of his property, namely, his ownership in the highroad which passes through his land. He has not been consulted in the matter, nor has he been paid in any way. This is one obvious anomaly, and the development of this idea will show how inequitable the system of granting franchises of this nature has become.

Furthermore, the existing railroad company which has paid for right-of-way suddenly finds itself called upon to compete with a rival, claiming to be precisely as efficient, which has acquired its right-of-way at no cost. Moreover, the new comer not only competes with the existing railroad, but impairs its efficiency by crossing it at grade, necessitating slowing of trains and additional cost for protection of the crossing. Obviously, these also are inequitable conditions, but the lawyers, and presumably the judges, have been a good deal puzzled to find a way out of the situation, in which innocent parties suffer through the inadequacy of existing laws.

Under such conditions the decision of the Supreme Court of the State of Pennsylvania becomes remarkably interesting. There, as lsewhere, the rights and power of the city railroads have grown gradually. Their cars were at first a substitute for the omnibus and other vehicles, were used only for the carriage of passengers, and were hauled by horses. In 1876 and in 1878 the street railroad companies of Pennsylvania received legislative right to use other than animal power, but the provisions of the acts of those years show that the railroads contemplated were for the accommodation of crowded streets of cities and for no other purpose. No power of eminent domain was conferred upon the companies. The general law relating to such corporations which was passed in 1889 was intended to bring together the valuable provisions of previous acts but did not extend the rights of the companies.

From the provision of the acts the Court concludes that it is apparent that "the attempt now being made to convert city railroads into long lines of transportation, connecting widely separated cities and towns by electric railroads, traversing country roads, was not anticipated or provided for by the legislature. The failure to confer upon these companies the power of eminent domain would alone be sufficient to justify this conclusion."

The land taken for streets in cities and boroughs is in the exclusive possession of the municipality, and the construction of a street passenger railroad does not "impose additional servitude on the property fronting on the street," but the easement acquired by the public is for passage only. The owner is entitled to the possession of his land for all other purposes.

It was held by this Court that the occupancy of a country road by a pipe line imposed an additional servitude upon the farm owner, while a pipe line laid within the limits of the city, with the authority of a city did not impose any additional servitude. The same distinction exists and for the same reasons between urban and suburban property as to the right of corporations to occupy a highway with a street passenger railroad. The reasons for the distinction are not given in the decision before us, but the Court says that the occupation of a highway for a street passenger railroad is an urban servitude to which suburban property has not been subjected by law up to this time. "The consent of township authorities justifies an entry upon the public road so far as the public is concerned, but the supervisors of the townships have no right to bind private property, or subject it to a servitude for the benefit of any person or corporation other than the township and the public it represents. The carriage of passengers through the township on their journey from one city or borough to another, by rail, is in no sense a township purpose; and whether these passengers make their journey in cars drawn by a locomotive over a steam railroad or in those propelled by electricity over tracks laid on the highways is immaterial to tax payers and to land owners", except as the adoption of one or the other of these modes of transportation may affect the township roads or the private property of citizens.

The street railroad companies cannot reach the property owners either through the local authorities or by the right of eminent domain, as the law now stands, and it is not easy to see how such a company can protect itself in the use of country roads except by contract with every property owner along the roads they wish to occupy. Under this decision an extra-urban street railroad cannot be built in Pennsylvania along the highways and public roads, by the simple authority of township officers. The property owners must

be dealt with individually, and their rights cannot be taken away by condemnation proceedings.

Of course all this is only the interpretation of the laws of Pennsylvania. How far the same principle may be carried in the laws and decisions of other states nobody can say now. In the state of New York legislation has progressed a little further than in Pennsylvania. Street surface railroads there, in any city, town or village, or in any two or more civil divisions of the state, may be built under the provisions of the general railroad law of 1890. These require the consent of the owners of one-half the value of the property along the street or road as well as the consent of the local authorities. But if the consent of the necessary property cannot be obtained recourse may be had to the supreme court in the form of an application for the appointment of three commissioners to determine whether the railroad ought to be constructed and operated. Notice of this application must be served personally on the non-consenting property owner. After proof of service the court shall appoint three commissioners who shall determine whether the railroad ought to be constructed and operated, and their affirmative decision shall be taken in lieu of the consent of the property owners. A similar course may be taken with regard to changing the motive power of a horse railroad to cable or electricity, or any other power than locomotive steam power.

In the state of Connecticut, as the reader knows, this whole matter is before the legislature and is being fiercely contended over. The railroad commissioners consider that "disinterested opinion favors an independent right of way for electric roads between towns, to be acquired in a similar manner as the right of way of steam roads," and there is expectation that a law to this effect will be passed by the present legislature. The commissioners of that state have repeatedly urged legislative action to prohibit the crossing of steam railroads at grade, by horse, cable or electric roads. In 1889 an act was passed which in terms, prohibited such crossings. This was modified in 1893 to permit grade crossings upon the approval of the railroad commissioners. The commissioners have interpreted this as being equivalent to direct instructions that in some cases such crossings should be allowed. But during the year 1894, in the only two applications brought before them, they declined to approve of the grade crossings unless such details of construction were agreed upon between the companies as would make a collision impossible. The commissioners of that state are of the opinion that it would be better to prohibit absolutely the crossing of street and steam railroads at grade, and that if expedient the municipality and the state, as well as the two companies, should share the expenses of the separation of grades.

This of course does not touch the question of the right to occupy the highway, but it is an important part of the movement to control reasonably the construction of electric railroads. The commissioners of other states have made energetic protest against the multiplication of grade crossings of this character.

A member of the Court of Errors and Appeals of New Jersey, in an interview had after the publication of Justice Williams' decision, and printed in the *Evening Post* of New York, says: "It is my belief that this decision would be applicable in New Jersey." He does not think that the law under which trolley lines in that state are now operated can be considered as giving the right to eminent domain. This question has never been raised in the courts of New Jersey. He agrees with Justice Williams that the laws originally framed for street railroads did not anticipate the conversion of suburban roads into long lines of transportation, connecting widely separated cities, and it is his belief that a company cannot secure the privilege of such a road except by contract with every property owner along the road to be occupied.

It is quite obvious that the Pennsylvania decision has marked out the lines along which the struggle between the steam railroad and the electric railroad interests will be carried on in many states.

The Bond Market in March.

The market for railroad bonds during March was very active and generally higher. It reflected even in a greater degree than the market for stocks the distinct improvement which has taken place in almost all lines of business. Furthermore there is a theory that the bond syndicate began operations for higher stock and bond values early in the month with a view to making American securities attractive to foreigners, expecting thereby to keep sterling exchange rates below the specie point. At any rate the demand for railroad bonds spread until it became greater than at any time within a year.

While buying was chiefly for local account, there was a considerable demand from foreigners. Purchasers were discriminating, however, taking only those issues which have an intrinsic investment value, or those which are regarded as a good speculation. It was in the latter classes that the greatest demand existed. The Southwestern issues were favorites; for the most part they are low and their future is regarded as promising, especially in view of the sharp advance (nearly 1c. per lb.) in cotton which occurred during the month. This higher price means an increased purchasing power for a vast area. It guarantees a heavy movement of merchandise to meet wants which have become acute. Those bonds whose interest is conditioned upon the prosperity of the region have naturally been quick to respond.

Specific factors operated to influence individual issues. Thus the unusually heavy demand for Atchison 4s and 2ds, and resultant higher prices, was started by the understanding that the underwriting syndicate had been completed, practically guaranteeing the success of the reorganization plan. Later it was claimed that the buying was by interests which realized that the critical stage of Atchison's affairs had been reached and which sought to carry assents to the reorganization by storm by rendering the securities active and higher. The activity and appreciation of Reading issues is regarded as largely speculative. There are some who profess to believe that Reading will profit by a coal trade settlement; but this hardly seems probable in view of the fact that Reading will not receive an increase in its coal allotment. The bullish sentiment, however, has given certain insiders an opportunity to unload their holdings. The issues of the coal group generally have been stronger and logically so upon the prospects of a termination of the cut-throat competition in the coal trade. The bonds of the Ohio roads all appreciated on the formation of a soft coal pool which will guarantee the various roads profit in handling the business.

Sales of leading active issues during March, par value, were as follows:

Atchison 4's	$3,124,000
Atchison 2ds "A"	1,294,600
Broadway & Seventh Ave. 5's	363,000
Ches. & Ohio gen. 4½'s	881,000
Erie 2ds	423,000
Hocking Valley 5's	343,000
Kansas & Texas 4's	740,000
Kansas & Texas 2ds	2,103,000
Mo., Kan. & Eastern 1sts	458,000
Northern Pacific 5's	1,0 3 000
Reading gen. 4's T. R.	438,000
Reading 1st incomes	767,000
Reading 2d incomes	663,000
Reading 3d incomes	710,000
Rio Grande Western 4's	201,000
St. Louis Southwestern 1sts	474,000
St. Louis Southwestern 2ds	606,000
San Antonio & Aransas Pass 4's	369,000
Southern Railway 5's	1,103,000
Texas & Pacific 1sts	428,000
Texas & Pacific 2nds	1,988,000
West Shore 4's	333,000

February Accidents.

Our record of train accidents in February, given in this number, includes 43 collisions, 92 derailments and 8 other accidents, a total of 143 accidents, in which 18 persons were killed, and 119 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

COLLISIONS:	Rear.	But. ting.	Crossing and other.	Total.
Trains breaking in two	1	0	0	1
Misplaced switch	4	0	1	5
Failure to give or observe signal	4	0	0	4
Mistake in giving or understanding orders	0	2	0	2
Miscellaneous	8	3	2	13
Unexplained	7	3	8	18
Total	24	8	11	43

DERAILMENTS.

Broken rail	16	Broken parallel rod	1
Loose or spread rail	1	Broken snowplow	1
Defective bridge	1	Derailing switch	1
Defective switch	1	Bad switching	1
Defective frog	1	Careless running	1
Broken wheel	1	Landslide	1
Broken axle	7	Washout	1
Broken tire	1	Snow or ice	13
Broken truck		Malicious obstruction	1
Broken drawbar	1	Unexplained	39
Fallen brakebeam	2		92

OTHER ACCIDENTS.

Boiler explosion	2
Broken side rod	1
Cars burned while running	1
Breakages of rolling stock	1
Other causes	3
	8
Total number of accidents	143

A general classification shows:

	Collisions.	Derailments.	Other accid's.	Tot'l.	P.c.
Defects of road	0	20	0	20	14
Defects of equipment	1	14	4	19	13
Negligence in operating	24	3	1	28	20
Unforeseen obstructions	0	16	3	19	13
Unexplained	18	39	0	57	40
Total	43	92	8	143	100

The casualties may be divided as follows:

Killed.	Collisions.	Derailments.	Other ac'dts.	Total.
Employees	4	7	2	13
Passengers	0	2	0	2
Others	0	3	0	3
Total	4	12	2	18
Injured.				
Employees	35	39	1	75
Passengers	20	22	2	44
Others	0	0	0	0
Total	55	61	3	119

The number of trains involved is as follows:

	Collisions.	Derailments.	Other ac'dts.	Total.
Passenger	24	42	6	72
Freight and other	59	58	2	119
Total	83	100	8	191

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road	0	12	1	8
Defects of equipment	0	2	2	2
Negligence in operating	0	20	4	35
Unforeseen obstructions and maliciousness	0	0	1	12
Unexplained	2	10	5	18
Total	2	44	13	75

Thirteen accidents caused the death of one or more persons each, and 36 caused injury but not death, leaving 94 (66 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with February of the previous five years shows:

	1895	1894.	1893.	1892.	1891.	1890.
Collisions	43	37	84	85	93	64
Derailments	92	65	117	115	98	55
Other accidents	8	3	13	12	10	9
Total accidents	143	105	214	212	196	128
Employees killed	13	11	45	37	52	50
Others killed	5	1	14	7	9	3
Employees injured	75	45	127	55	161	111
Others injured	44	13	176	28	114	69
Passenger trains involved	72	38	83	79	85	44
Average per day:						
Accidents	5 11	3.75	7.64	7.31	7.00	4.57
Killed	0.64	0.54	2.11	1.52	2.18	1.89
Injured	4.25	2.07	10.82	3.55	9.82	6.42
Average per accident:						
Killed	0.126	0.143	0.276	0.208	0.301	0.414
Injured	0.832	0.552	1.416	0.486	1.403	1.406

The number of persons killed in train accidents in February was smaller than in any other month for many years except February, 1894, and April, 1890. Of the four most serious passenger train accidents (Guthrie, Ceredo, Franklin and Greenville) only one is classified as due to negligence in operating, and the number of fatal casualties entered under this head is only about one-fourth of the total. At the same time, February was an unfavorable month for train running, the storm and cold weather of Feb. 7–10 having been widespread. Of the derailments from broken rails 12 are reported as occurring to passenger trains, and the total number of accidents of this kind was by no means small.

The number of collisions and derailments on account of the snow was of course considerable; four were of sufficient consequence to be noted by name in the record. The impracticability of trying to make a complete record of cases of this kind may be understood by a newspaper item from Lyons, N. Y., on Feb. 9, which stated that four engines were off the track in the yard there at one time. Probably this is a sample of many similar items, written or unwritten, which escaped us.

Electric street cars were struck by locomotives at Philadelphia, Feb. 6, and at South Wilkesbarre, Pa., on the 7th. At Chicago three passengers in a horse car were injured by a locomotive which struck the car and wrecked it. It is said that the horses became frightened and dragged the car across the track in front of the locomotive. An electric car was struck by a locomotive at Braddock, Pa., in consequence of the trolley jumping off the wire at a critical moment; one passenger was killed. Similar accidents, less disastrous, happened at Philadelphia on the 18th and Pittsburgh on the 19th. At Milwaukee, on the 4th, an electric car ran into an open draw and two passengers and the motor man were drowned. Electric cars collided with each other at Kansas City, Kan., and Columbia, Pa.; one ran away down a steep hill at Pittsburgh, and there was a similar accident at Richmond, Va. Collisions and less serious accidents were numerous on the street railroads of Brooklyn for many days during and subsequent to the strike, in consequence of the inexperience of the motor men.

Collisions of passenger trains occurred near St. Johns, Quebec, on Feb. 6, and near Weston, Ont., on the 8th. There was a disaster on the Interoceanic Railway of Mexico, Feb. 28, killing many passengers, which has already been reported in the *Railroad Gazette*.

On the New York Central, near Rochester, a signalman was stricken with paralysis just as a passenger train was passing, and before he had replaced the signal at danger; and he was barely able to call a section man into the tower in time to reverse the signal behind the train. At Youngstown, O., a signalman was adjudged insane, and on the inquiry it was stated that the man's mind had been unbalanced for two months, and that for all this time he had had a constant morbid feeling which led him to desire to wreck a train.

The British Board of Trade has just issued the report of the committee appointed a year ago to revise the forms used by railroad companies in reporting accidents and to suggest improvements in methods. The report recommends revised forms for use by the Board of Trade for tabulating all of the information usually given in the quarterly blue books on this subject and makes a number of recommendations, of which the principal ones are: Fatal accidents should be reported within 24 hours; nonfatal accidents to employees should be reported whenever they are such as to prevent the employee from working five hours on any of the next three working days; nonfatal accidents to other persons should always be reported, no matter how slight. In every case the report should state the time of day; whether the employee is above 18 years old or not, his regular working hours and the number of hours he had been on duty; and finally

the road should report every year the number of persons employed in each department. The tabular forms have been extensively revised. The first classification is the same as before, viz.: 1, persons killed or injured in train accidents; 2, ditto by movement of railroad vehicles where there is no train accident; 3, ditto by other accidents on railroad premises. Table No. 1 is about the same as before, except that persons on business at stations and sidings are separated from "miscellaneous." Table No. 2 shows the number of persons killed and injured, classifying them according to the kind of accident. This, and in fact all of the tables in the pamphlet except the last two refer primarily to the number of persons and not to the number of accidents; but the last two tables, No. 11 and 12, are similar to No. 2, except that they refer to accidents instead of to persons; No. 11 is a summary and No. 12 shows the number of train and roadway accidents of each kind on each road. Collisions and derailments are entered against the company on whose lines they occur, but failures of rolling stock are entered against the company to which the vehicle belongs. Table No. 3 shows injuries connected with movement of vehicles, but where there is no train accident. Table No. 4 shows the facts of table No. 2 for each road, but in this the passengers, employees and others are lumped together in the columns under the causes, although employees are separated from the others in the total for each road. Table No. 5 is arranged the same as No. 4, but gives injuries not connected with train accidents. This table is divided into three parts. *A*, passengers; *B*, employees; C, other persons. Table No. 6 gives the total of passengers, employees, other persons having business, etc., and trespassers, killed or injured in train accidents and by movement of vehicles, divided according to the nature of the injuries that they suffered. There are 16 columns in this table, and the figures for two years are to be given. Table No. 7 gives similar information concerning employees, and divides the employees into 40 classes. This information is not given by roads. Table No. 8 is a summary statement of accidents to persons on railroad premises, but in which there was no movement of railroad vehicles; such as passengers ascending station steps, employees injured in freight houses, etc. This table has a column for a comparison with the previous year, for the United Kingdom, but not for the three countries separately. Table No. 9 is similar to No. 8, but is for employees only, and shows the number for each road separately, which has never been done before. Table No. 10 is similar to No. 7, except that it is for cases not connected with train accidents or the movement of vehicles.

Mr. Neilson, the Second Assistant Postmaster-General, has been in Boston this week to see about arrangements for carrying the mails on street cars in that city, as has been done for several years in St. Louis and more recently in Brooklyn and other places. The arrangement for using the cable railroads for this purpose in New York city, which were noted in these columns last week, are not yet completed, though we understand that the questions yet to be settled concern only minor details. Mr. Neilson, who is well-known to many of our readers as a former railroad superintendent, evidently intends to bring the mail facilities up to date in all the large cities of the country. At Boston the branch offices are so widely scattered that there should be a good opportunity for saving time by increasing speed. Meantime the conductors and motormen of the West End Company, which controls about all the street railroads in Boston, are protesting against the use of that company's lines for carrying the mails on the ground that "it is a cold-blooded pretext to secure the assistance of federal bayonets" whenever the employees shall take a notion to tie up the road. A bill was brought before the state legislature to authorize this company to contract to become a mail carrier and it was voted down in committee. The Massachusetts legislature has had the reputation in years past of being above the average in intelligence and public spirit, but when it comes to bowing to the "labor vote" the New England statesman seems to be on precisely the same level with his brethren in states where "culture" is not proclaimed on the housetops.

Since the Debs strike numerous ex-railroad employees in various parts of the West have complained a good deal about the oppression they are suffering by means of the blacklist, and the newspapers have favored them so far as to notice their claims fully as much as they deserved. In Colorado the discontented men succeeded in getting a legislative committee to investigate the subject, but that committee not only reports an entire lack of evidence, but also finds ample ground for all the misfortunes which the idle men are suffering under without charging them to the blacklist. The report says:

"From the evidence obtained we do not believe there is any regular system of blacklisting discharged employees by the railroad companies except in so far as the clearance letter given to them answers that purpose. Men who participated in the recent American Railway Union strike are given letters stating that their services were satisfactory up to the time of the strike. . . . The companies do not 'hound men from place to place,' nor use secret marks on the clearance letters. . . . ." One member handed in a minority report stating that each of the division superintendents on the Union Pacific had a list showing the names of men that had been discharged on all other divisions, as well as on his own, but the Superintendent of the road said this list was never sent to other roads. The chief point of the minority report is that railroads in thus excluding strikers from their service, "make no allowance for the fact that the striker was not guilty of violence or of interference with men at work for the company."

The newspapers all over the country have been publishing during the past week a report that the New York Central would put some electric passenger cars on the line between Buffalo & Niagara Falls, operating them by means of an overhead wire and trolley, but it does not appear that there is any substantial foundation for the report. The story was first printed as an "exclusive" in a Buffalo paper, which stated that the information came through the New York Central's lawyer in that city; but, in a later interview, one of the promoters of the electric street railroad which is to be built between Buffalo and the Falls asserts that the aforesaid lawyer is "hanging out a big bluff," and it appears that the New York Central has not made any arrangements for electrical equipment. Indeed, so far as the existing tracks of the Central are concerned, such a scheme is practically out of the question. This part of the line is traversed by very frequent trains throughout the 24 hours; and many of these trains are fast and heavy. If the New York Central people thought seriously of staving off the competition of a new passenger line between Buffalo and the Falls, they would naturally take up first the question whether it would pay to build an additional track or tracks along their present right of way, but it does not appear that they have yet seriously considered even that. The careful reader will have noticed that the interviews with New York Central officers, which seem to confirm the reports printed by the newspapers, are worded in such a way as to convey, in some instances, very delicate shades of meaning.

The most acute instance of injury to a steam railroad by the introduction of electric motors for street cars, that we know of, is to be found in Brooklyn, where the Brooklyn Elevated Railway Co., claims to have been so greatly damaged by the establishment of electric lines on the streets traversed by its trains that it refuses to pay its taxes. The arrears for two years amount to about $170,000, and the taxes appear to have been assessed on the same valuation that was used prior to the introduction of the electric cars. The city authorities are firm and the road has now begun a suit to restrain them from selling its property. The complaint in the suit sets forth that in 1892 a franchise was granted to the surface roads to use electricity and increase the speed of their cars from 6 to 10 miles an hour, thus giving them the same rights as to speed as the elevated roads. In spite of this, however, the latter are not taxed on their real estate, while the elevated company is so taxed. The property of the company, it is said, has diminished in value from $200,000 a mile to less than $100,000.

NEW PUBLICATIONS.

The Car Builders' Dictionary.—An illustrated vocabulary of terms which designate American Railroad Cars, their parts, attachments and details of construction. Compiled for the Master Car Builders' Association. By Professor John C. Wait assisted by Messrs. R. H. Soule, A. E. Mitchell and C. A. Smith, a Committee of the Association. Third edition, 546 pages, 8½ in. × 12 in., 5,683 illustrations. New York: *The Railroad Gazette*, 32 Park Place; 1895. Price $5.

The Car Builders' Dictionary began in a very modest way in 1872 when a committee of the United American Master Car Builders' Association was appointed to publish a dictionary of terms. This committee consisted of F. D. Adams, M. C. Andrews, Leander Geary, C. A. Smith, Joseph Jones, I. W. Van Houten and A. Steinbach. Mr. Leander Garey was at that time Master Car Builder of the New York Central & Hudson River Railroad, and Secretary of the committee, and was for years President of the Master Car Builders' Association. The committee began by sending out circulars to ascertain the names in common in use different localities and in the course of some half dozen years accumulated considerable information which, however, was not published until the *Railroad Gazette* took hold of the enterprise in 1879. Then the first edition of the Dictionary was compiled by Mr. M. N. Forney, one of the editors of the *Railroad Gazette*, assisted by Mr. Leander Garey and Mr. C. A. Smith.

In 1884 the second edition, revised and much enlarged, was published under the editorial charge of Mr. A. M. Wellington, at that time on the editorial staff of the *Railroad Gazette*, who was assisted by members of the Executive Committee of the Association. In the ten years that elapsed between the publication of the second edition and the third edition which now appears, many changes have been made in practice, involving not only new forms and new dimensions, but new terms as well, and the material in the third edition is to a considerable extent new. The illustrations are, with the exception of a few pages, entirely new. A notion of the increase in the size of the Dictionary is given by the number of illustrations contained in the three editions. That of 1880 contained 811 illustrations; the edition of 1884 had 2,188 and the edition of 1895 has 5,683. Naturally the changes in the text have not been nearly so many, although this part of the book had to be entirely reset.

The increase in the total number of engravings is due partly to the greater number of subjects illustrated, partly to the greater number of types of cars shown, but still more to the number of illustrations of each kind of car, showing the special features of the present practice of different car builders. The intention has been to give to some extent designs which could be compared. The line drawings have been carefully detailed and dimensioned, and the development of the process of half-tone engraving from photographs has permitted free use of perspectives of cars and their parts which aid greatly in giving a clear idea of construction and arrangement.

The process of revision has been tedious beyond what anybody who has not undertaken such a labor could imagine, and the appearance of the work has been delayed by causes beyond the control of the publishers. They offer it now in the hope that in accuracy, scope and completeness of detail and in mechanical execution it will meet the expectations of those in all parts of the civilized world, who have found the "Car Builders' Dictionary" a unique and indispensable work.

Rand, McNally & Co.'s Business Atlas for 1895 has some noticeable changes in the familiar and characteristic features of former editions. The most important change is in the method of distinguishing the different railroads. The old color scheme by which the lines of each railroad were printed in one color in distinct contrast with the colors used on neighboring railroads has been given up and the different railroads are now distinguished by large numerals printed in red, the same number being used for all the lines or branches of a railroad on a map. This change does not seem to be an improvement. With a color individual to one company and assigned to all its lines, the location of any portion of a company's lines could be picked out and its location relative to other railroads immediately comprehended. No such easy grasp of the position of a company's lines is possible by the scheme now adopted. If the idea in making the change has been to lessen the cost of producing the book, the reputation of the publishers is assurance enough that a question of economy will not be allowed to affect the value of the volume and that the change will not be continued in future editions if experience does not commend it as convenient.

It would also seem to be desirable to retain the enlarged section maps in those states where the railroads are pretty close together on a map. Railroads in such states as New York, Ohio and Illinois can hardly be studied as thoroughly as is often desirable where only double-page maps can be consulted. These are features of former editions which it seems desirable to retain in future editions of the atlas. They are the only points on which we are disposed to criticise it.

It is much easier to point out a few things which we would like to have changed than to attempt to speak of the many good features of the atlas. Its accuracy is beyond question. That is the chief test of the value of an atlas, of course, and the publishers have made an accurate atlas above all things else. Many expensive atlases are misleading in their representation of railroad lines, but this one can be used with every confidence that the railroads are correctly located. The size of the atlas is convenient, the pages being 13¼ in. by 18½ in;, but most states are shown by double-page maps. Excellent maps of about 20 of the larger cities greatly increase the value of the work.

All the important rivers, islands and lakes in each state are indexed, as well as the counties and all the post-offices. The reference index to the latter shows the branch or division of a railroad on which each station is located, and the key lines on the map locate its exact position. It is surprising how many towns are located without impairing the clearness of the map.

The atlas is thoroughly up to date. The plates have been corrected to show the railroads built in the last year, and in this important respect no atlas is so complete and satisfactory.

Helios. By E. D. Meier. Fourth edition. St. Louis: The Heine Safety Boiler Co., 1895.

The fourth edition of Mr. Meier's capital little handbook on the means of getting the power of the sun's rays out of fuel and directing it to the uses of mankind, is issued under the date of Jan. 1, 1895. The new matter in this book is an article on "bagasse" as a boiler fuel, and seven new tables. The chapter on chimneys and draught has been entirely re-written and enlarged. Probably a good many of our readers do not know "Helios." It is an unblushing advertisement of the Heine boilers, but it has the merit of being a book of such utility to steam engineers, so judiciously compiled, so practical and accurate and well arranged that it is a valuable handbook. Mr. Meier, the President of the Heine Safety Boiler Co., in his introduction to the first edition, says: "In the following pages we give some account of the fuels used in the practical arts, of the water which becomes the vehicle for transmitting their energy into mechanical power, and of the limitations imposed by their varying conditions. Much of the text and many of the tables are taken from Mr. David Kinnear Clark's admirable book on the Steam Engine" with his consent and that of his publishers. Free quotations are made from other authorities and articles have been contributed by various writers.

The first chapter is on heat, three pages of which are an article signed with the initials, R. H. T., which initials we do not need to interpret. This gives an elementary description of the heat units, tables of equivalents of heat and power units, and comparisons of English and French units. Tables are given of boiling and melting points, and expansions of solids, and of specific heats. There is a short chapter of 3½ pages on combustion, giving particularly the conditions for complete combustion of fuel in furnaces, with tables of total heat

evolved by various fuels and equivalent evaporative power, of temperature of combustion and volumes of product, etc. The division of the book which treats of fuels fills 30 pages, and deals with coal, wood, bagasse, tan, straw, oil and gases. This division contains valuable and useful tables, as, for instance, the constituents and fuel value of a great variety of American coals, and of some British and foreign coals. The chapter on fuel gas also contains much useful data. The chapter on water occupies 16 pages and treats of water in its capacity as a vehicle for transmitting the energy of the sun's rays into useful work; which sounds general, but as a matter of fact, the chapter is quite specific. Steam fills 38 pages. The tables here give the properties of saturated steam, outflow from a given initial pressure into various lower pressures, outflow into the atmosphere, cylinder condensation and entrainment with various engines under various conditions, total stored energy of various steam boilers, results of tests of a number of Heine boilers, giving capacity, evaporation, fuel consumption, horse-power developed, etc. In this chapter are various other tables which we have not mentioned, and the text is a short disquisition on steam. The chapter on chimneys and draft fills 11 pages, giving in a compact form most that is known on this matter. Finally, there is a chapter on boilers, with a description of the Heine boiler and its performances. Valuable and useful tables are appended and the volume has an alphabetical index of eight pages.

The *Financial Review*, the annual "Red Book" issued by the publishers of the *Commercial and Financial Chronicle*, has some articles of special value in the edition recently issued. The name of the publishers is sufficient guarantee that the numerous statistical compilations have been very carefully prepared, and may be accepted as accurate. Eleven pages are given up to a retrospect, by months, of the business conditions of 1894, which is an admirable review of the financial and industrial conditions of the year. Railroad earnings in 1894, the iron trade, anthracite coal production, the cereal crops, and the business failures of the year are well discussed in editorial articles. The volume contains other articles, reviewing the commercial and financial happenings in Great Britain in 1894; trade and commerce of the United States, exports, imports, and trade balances for 30 years; comparative prices of merchandise for a series of years; gold and silver production of the United States; product of gold in the Australasian Colonies; gold and silver production of the world since 1870; Foreign Exchange in New York, prices in 1893 and 1894; United States Debt, 1793-1894, and monthly range of prices since 1860; New York Stock Market, highest and lowest prices of stocks and bonds monthly, 1890-1894; railroad stocks and bonds in Boston, Philadelphia and Baltimore—monthly prices in 1894, and listings of railroad securities on the New York Stock Exchange.

The last number of the *Investor's Supplement* a mine of facts as to the financial condition and history of the railroads of the country is bound with the volume. The price of the *Financial Review* is $2, subscribers to the *Chronicle* securing it for $1.50.

Contract Trial of the Minneapolis.—At the annual meeting of the American Society of Naval Engineers and Marine Architects held in New York a few months ago, Mr. Albert B. Willitts, Passed Assistant Engineer United States Navy, presented a careful paper on The Contract Trial of the United States Triple-Screw Protected Cruiser Minneapolis. The George F. Blake Manufacturing Company, 95 and 97 Liberty street, New York, and other cities, has reprinted this paper in a pamphlet of 30 pages with a number of illustrations as an advertisement of the Blake steam pumps. The Minneapolis, the New York and the Columbia are supplied with an outfit of Blake pumps, including the Blake vertical twin air pumps for the condensers of the main engines. In the report of the trial made by Mr. Willitts considerable space is given to the variovs Blake pumps on the vessel Copies of the reports of the trials of the New York and Columbia, as well as reports of the Minneapolis, may be had from the Blake Company.

The Journal of the Iron & Steel Institute.—Vol. XLVI., No. 2, 1894. Edited by Bennett H. Brough, Secretary. New York: E. & F. N. Spon, 1895.

This volume of the Journal of the Iron & Steel Institute of Great Britain contains the record of the Brussels meeting held last August. Two hundred and twenty-four pages are given to the papers and discussions, and 24 pages to accounts of the various visits and excursions made. An important part of the volume is the summary of industrial information under the title of Notes on the Progress of the Home and Foreign Iron and Steel Industries, which fills 267 pages. This summary is made from year to year, and is an excellent current history. The volume closes with a thorough alphabetical index filling 23 pages.

Accompanying this volume is a brief index of the papers contained in the Journal from 1869 to 1894, inclusive, which is a pamphlet of 30 pages and will be of great interest to students who have access to the Journal.

TRADE CATALOGUES.

Testing Machines and Appliances.—The Riehlé Brothers Testing Machine Co., Philadelphia, Pa., issues a new illustrated catalogue, showing improved automatic and autographic testing machines and appliances as designed and made by that house. It is a volume of 122 pages, 9½ in. × 12 in. Eight pages are given to lists of those who have purchased these testing machines; these names, it is said, being only of those who have purchased since the first edition of the catalogue was published. Strain diagrams are shown giving facsimiles of records by the autographic machines. There are half-tone illustrations of some of the latest machines and wood engravings of older ones. These include a 300,000 lb. screw power machine, a 200,000 lb. automatic and autographic machine, etc. There are a number of pages of careful description and directions for the use of the machines and for preparing cement briquettes for testing. "Frictionless ball-bearing" screw-jacks are shown, as well as the Riehlé-Anderson safety track-jack for railroad use. Trucks, push-cars and various other specialties are included in the catalogue, which has a table of contents.

Automatic Hoisting and Conveying Appliances.—The Brown Hoisting & Conveying Co., Cleveland, O., and Havemeyer Building, New York, issues a new catalogue of 46 pages showing its apparatus in great variety. There are many excellent illustrations showing the apparatus as used in harbors for handling coal and ore, the hoisting and conveying cranes used on the Chicago Main Drainage Canal, the movable tramway system for handling material in sewers and similar work, traveling cranes for use in great yards, cantilever cranes for handling heavy weights in furnace yards and iron mills, cable tramways, etc. The pamphlet gives short descriptions of these ingenious and efficient installations with extracts from reports of efficiency.

Jib and Traveling Cranes.—The Phœnix Iron Works Co., Cleveland, O., issues a catalogue of 36 pages, with photographs of jib cranes and traveling cranes. This book was got up to show the styles of cranes in common use, and includes those operated by electric, steam, hydraulic, belt, and hand power, not only in foundries, shops, etc., but also railroad and locomotive cranes. Beside the cranes are cuts of railroad turn-tables, hydraulic presses, foundry ladles and winches made by this company. The catalogue is 6½ × 9½ in. and is neatly got up.

Light Inspection Cars.—The Railway Cycle Manufacturing Co., of Hagerstown, Ind., issues a small pamphlet containing engravings and short descriptions of some of the light inspection cars made by it. In our issue of March 8, page 151, two of these cars were shown.

D. Van Nostrand Co., 32 Murray and 27 Warren streets, New York, have just issued a revised edition of their catalogue of books in steam and mechanical engineering arranged by subjects.

Big-Four Coach Yard at Indianapolis.

The passenger car yard of the Cleveland, Cincinnati, Chicago & St. Louis Railroad in Indianapolis has many desirable features for the economical and rapid handling of cars. It is situated about half a mile east of the Indianapolis Union Station, between Dillon and Leota streets, just south of the main tracks. The capacity of the yard is 50 cars, and the arrangements for washing, cleaning and heating, and for testing the air-brakes are very complete.

There are nine tracks lying diagonally as related to the main line. They lead into a ladder track, which is parallel to the main line, and they are of varying lengths.

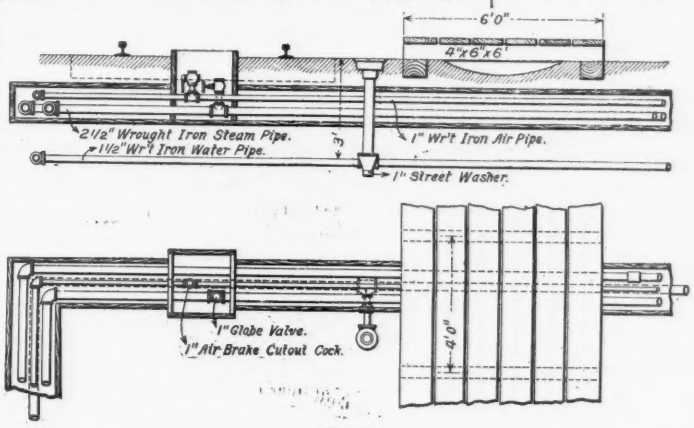


Fig. 1.

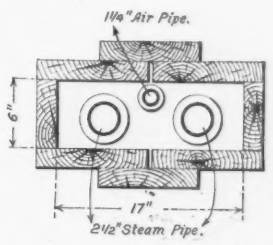


Fig. 2.

Details of Pipes for Steam, Water and Compressed Air; C., C., C. & St. L. Passenger-Car Yard, Indianapolis.

The five which are stub tracks have Ellison's cushioned bumpers. The piping extends throughout the yard and there are openings for drawing water 100 ft. apart, longitudinally along the tracks, and adjacent to each platform, making 46 openings in all. There are openings for getting air and steam at two places on each track, about 360 ft. apart. These, as shown in the detail drawing, Fig. 1, are in each case in the middle of a track; eight tracks are thus supplied. The platforms, as will be seen by the drawing, are only slightly higher than the rail level.

Steam and air are supplied from a special boiler south of the tracks; the return system is used. Westinghouse air pumps, placed in the boiler-room, furnish the air, the pipes of which parallel the steam pipes, and in addition extend to the drop pit at the eastern extremity of the yard. Compressed air is used in dusting the cushions of the seats. Water is supplied from the city mains. There are board-walks, 6 ft. wide, between all tracks. There is a pneumatic wheel pit and it is situated at the eastern extremity of the yard near the entrance. The construction of this pit is similar to that of the pit in use on the Chicago, Rock Island & Pacific, which is illustrated on page 13 of the report of the M. C. B. committee on compressed air appliances and hydraulic machinery.

To obtain hot water it is only necessary to make connection with a short hose to a steam pipe and let the steam into a bucket of cold water. With the numerous taps provided there is no necessity of carrying the water any great distance.

Fig. 1 shows in plan and cross section the method of arranging the pipes. All pipes are of wrought iron and are galvanized. A space not less than 4 in. is left between the two steam pipes to allow for expansion at angles. The steam and air pipes in boxing are packed with mineral wool. A cross-section of the boxing is shown in Fig. 2. At the places where connections are to be made to the cars are vertical boxes 21 in. square, in each of which there is a 1 in. cock for air and a 1 in. globe valve for the steam. The water pipes are beneath these, 3 ft. below the surface of the ground, connection being made with 1 in. street washers.

The tracks are spaced 18 ft. on centers, to allow plenty of room for cleaning the cars.

TECHNICAL.

Manufacturing and Business.

Mr. R. H. Hood, an engineer and contractor with office at Twelfth and F. streets, N. W., Washington, D. C., is in the market for about $1,500 worth of ropes, locks, tackle and riggers' outfits, generally.

J. A. Fay & Co., of Cincinnati, have secured orders from the West Australian Government Railroads for wood working machinery, covering a surface planer, vertical car tenoning machine, large rotary car mortising, recessing and boring machine and a band saw setting and filing machine, besides various tools, extra parts, shafting, belting, etc.

What is said to be the largest gas holder in the world will shortly be build by the Stacey Manufacturing Company, at Chicago. Its capacity will be 3,000,000 cu. ft. The tank will be 165 ft. in diameter and 35 ft. in height.

The new building of the Bonta Plate Glass Co., at Scranton, Pa., will be built by the Berlin Iron Bridge Co. The building will be 1,144 ft. in length, and will have a width of 140 ft.

A large machine shop, 250 × 150 ft. is being built by the Carnegie Steel Co. at Homestead, Pa. The company has decided to equip the entire plant with electric cranes.

The Northern Pacific has secured an option on the buildings of the Malleable Iron Works at South Superior, Wis., and will convert them into a car shop.

The Shultz Belting Co., of St. Louis, Mo., reports business as excellent, and among recent orders were 5,000 ft. belting to be sent to London, Eng., 5,000 ft. to Sweden, two large link belts to Mexico, in addition to large orders for belting from electric railroads.

The Merrill-Stevens Mfg. Co., of Niles, O., has a number of orders on hand for both the Cook and the Merrill cattle guards, and say that their business has opened up much better than they anticipated.

The Beckford Drill Co., of Cincinnati, O., is busy, and has orders for its upright drills from all sections of the country.

The National Railway Footguard Co., of London, O., has removed its office to Rooms 58 and 59 Clinton Building, Columbus, O.

The Long Manufacturing Co., of Cleveland, was incorporated at Columbus, O., last week to manufacture car dumping and other machinery and devices. The incorporators are E. A. Upstill, J. C. Walsh, J. Stovering, Timothy Long and Thomas Fleming.

The bridge works of Cofrode & Saylor at Pottstown, Pa., started up this week with contracts enough on hand to keep running for a long time.

A company called the Dustless Railroad Coach Company has been organized at East St. Louis to manufacture mechanical devices. The incorporators are: M. D Mugan, Thomas Furlong, John L. Naulty, Thomas Dix, Christopher Branch and J. M. Hennesey.

The Laidlaw-Dunn-Gordon Co., of Cincinnati, manufacturers of pumps and pump machinery have recently removed their business to the southeast corner of Pearl

and Plum streets. They report a very active demand for their manufactures.

The foundry of the machine shops of the Seaboard Air Line, at Raleigh, N. C., has been closed down, and castings will hereafter be bought.

Mr. John N. Poage, of Cincinnati, manufacturer of water colums, etc., has recently shipped several important orders to railroads in the South, and has a number of other orders on hand.

The Peerless Rubber Manufacturing Co., 16 Warren street, New York City, has reorganized and elected the following as officers: President and General Manager, C. H. Dale; Treasurer, C. C. Miller, and Secretary, Brown Caldwell. E. L. Perry is Superintendent, and H. W. d'Evers General Sales Agent. It is the intention of the company to double its present facilities for the manufacture of air-brake and steam heating hose, packing and other rubber goods in which this company deals extensively, in order to meet the increasing demands of the railroad business.

Iron and Steel.

The 12,000 tons of steel rails for a California railroad are said to have been contracted for by the Lackawanna Steel Co., at $22.75 per ton, delivered on the dock at Jersey City. It is said that foreign competition was barred because the order could not be filled in time.

The Augusta Southern Railroad has ordered 7,000 tons of 56-lb. rails from the Carnegie Steel Co. These rails will be used in changing the gage of the road to standard gage.

The Illinois Steel Co., of Chicago, intends to rebuild and modernize two of its largest blast furnaces at South Chicago.

The furnace of the Elk Rapids' Iron Company, at Elk Rapids, Mich., will shut down indefinately about May 1. This furnace was first put in blast in 1873, and since then has run almost continuously.

In one week in March the south works of the Lackawanna Iron & Steel Company, at Scranton, Pa., turned out 5,201 tons of finished rails. During the same week, the converting mill made 6,042 tons of ingots in eleven turns. These figures make a record for rapid rail rolling.

S. L. Severance, of Cleveland, representing the creditors, has purchased the plant of the Akron Iron Co. at sheriff's sale. The purchasers paid $200,000 for the property. The plant will be started with a full force soon.

New Stations and Shops.

The Hoboken Ferry Co. has contracted with the Union Bridge Co. for the new ferry house at the foot of Barclay street, New York City, and is temporarily using the new pier of the American Line. The weight of steel to be used will be 450 tons.

The plans for the new freight depot which the Big Four road will soon build at Louisville provide for a building 500 ft. in length and 100 ft in width.

The Atlantic & Danville Railroad has finally decided to establish its shops at Lawrenceville, Va., and the foundations for the buildings are now being put in.

The Collins Co., at Collinsville, Conn., is putting up a new retort house which will be of iron, designed and built by the Berlin Iron Bridge Co., of East Berlin, Conn.

The Michigan Central is, it is said, to move the headquarters of the Western division, now located at Michigan City, to Niles, Mich., within a few months.

Henry Smith & Sons, of Baltimore, have received the contract for the removal of the shops and roundhouses at Keyser, W. Va., about May 1, when the shops at that town will be torn down and the material loaded and taken to Cumberland, Md., to be used in the building of the new shops. Contractors are now being asked to bid on the buildings to be erected at Cumberland.

The plans for the enlargement of the Fitchburg Railroad shops at Keene, N. H., are now being carried out, and the work will be finished in a few months. It is expected that the capacity of the shops will be about doubled when the work now under way is finished.

The new Boston & Albany shops at West Springfield, Mass., are nearing completion, and in another month will probably be ready for occupancy. Part of the machinery has arrived, and some of it is in position. Trestles 80 ft. in height have been erected to support the water tanks, and the tanks will be 16 ft. higher and 25 ft. in diameter.

The plan of the Chesapeake & Ohio for building a new station in Richmond, Va. would appear to be now going forward to an early and successful conclusion. The approaches for the building are an especially difficult problem and that part of the work will be very expensive. The company proposes to connect two important divisions of its line in Richmond by a section of elevated railroad and the new station will be built in connection with this work. It will be used for both passenger and freight traffic and part of the building will be used for offices. The plans for the work have not yet been finally approved by the railroad and have still to be submitted to the City Council and County Commissioners for their authorization before the actual work can be commenced.

Interlocking.

The National Switch & Signal Co. has been awarded the contract for interlocking the new terminals of the Brooklyn Elevated Railroad at High Street, Brooklyn; also a plant for the Manhattan Beach Division of the Long Island R. R. The Company has completed the interlocking plant at the crossing of the Lake Shore & Michigan Southern and Indiana, Illinois & Iowa Railroads at South Bend, Ind. This plant consists of 14 working levers.

Electric Lights in Brooklyn Bridge Cars.

The apparatus and connections for lighting the railroad cars of the New York and Brooklyn Bridge by electricity are now completed and in use, and a number of the cars are already being lighted by this way. There are 10 16 c. p. lamps in each car, and the illumination is not only satisfactory but brilliant. As heretofore noted in the *Railroad Gazette*, the current to supply these lamps is conducted by means of an overhead wire running along the track, which is connected with the cars after the usual plan employed for conveying power on street railroads, though in place of the trolley there is used a triangular brass rod which slides upon the supply wire.

Smith's Three-Cylinder Locomotive.

In the *Railroad Gazette* of March 15th, 1895, page 164, under the head of Smith's Three Cylinder Locomotive, were given the results of comparative tests in engines No. 35, three-cylinder, No. 3, two-cylinder, and No. 4, three-cylinder. Owing to a mistake in copying the report (not our mistake), the water used by engine No. 4 was given as 29,927 pounds instead of 20,927, which was the correct figure. Likewise the length of the tests in engines No. 3 and No. 4 should be 1.1166 hours instead of 1.1666 hours. The remainder of the results, however, were deduced from the correct figures.

New Approach to Union Station, Baltimore.

The Pennsylvania Railroad Company is about to construct a new approach to the Union Station in Baltimore. Plans have been completed and the work of building the stairway and walks will be begun within a few days. Owing to the peculiar position of the station and the contour of the Jones Falls ravine all the avenues west of Charles street are cut off from direct access to the station. To reach it necessitates going several squares north or south. Two of the most extensive street-car systems of the city have lines passing along Maryland avenue, one square west of Union station, and, by means of the new approach, people coming in from either of these car lines will have but a short walk to the train.

The plans of the Pennsylvania Railroad Company contemplate the construction of a broad covered stairway leading from the Maryland avenue bridge to the terrace below on the north bank of the falls. From this point to the station a walk will be laid on a level with the railroad tracks and beneath the bridge at Charles street into the station near the west end of the car shed.

The Boston Subway.

The contract for the construction of the first section of the rapid transit subway has been awarded by the Commission to Jones & Meehan, of Jamaica Plain, Mass. The corrected bid is $136,602.

Cost of Torpedo Boat Destroyers in England and France.

The contract prices of a large number of the torpedo boat destroyers now being constructed for the British navy are given in a blue-book recently issued in England. The general dimensions of the vessels are about 200 ft. in length and from 230 to 240 tons displacement. Their engines are about 4,000 to 4,500 I. H. P. and a speed of 27 knots has been attained by them. Of this type three built by Messrs. Yarrow, of London, cost $187,000 each. Messrs. Thornycroft, of London, have built three at $182,150 each. The average price is about $185,000, though in some cases considerably higher than this. By way of comparison, it is interesting to note that the French Government recently paid $152,600 for a 27-knot torpedo boat only 140 ft. long and of only 123 tons displacement. Similar boats in the English fleet cost only $72,400 each. Of larger vessels the price of the 14,000 ton cruiser "Terrible" was $2,711,735, and that of her sister ship, the "Powerful," was $2,676,260.

Marlin's Distance Lock.

In the *Railroad Gazette* of March 22 we published a brief item concerning an apparatus devised by Mr. J. T. Marlin, of Kansas City, for locking the safe in an express car in such a way that it can be opened only after the car has traveled a certain distance. Since then we have received from the patentee a memorandum of his first trial trip which shows interesting details and indicates that the scheme is simple and effective. The trip was from Kansas City to Denver and return, over the Union Pacific, starting Feb. 26. The car was No. 1,440 and the messenger was Mr. D. D. Law. The lock was set for a dozen or more stations and in every case but one worked correctly. At one station the lock was set inaccurately and the safe could not be opened; but after the train had started and moved 10 ft. it opened all right. Different men on the train manipulated the lock, which shows that the method of operation was easily mastered. It was necessary to set the lock to open a short distance before reaching the station, as the distances were not known nearer than a tenth of a mile; but if the distance had been known in rods the lock could have been set much closer. The mechanism of the lock is similar to that of a time lock. It is operated by means of bevel and worm gears connected by a rod running up through the floor. The apparatus was attached to the car axle, at the center, in rather crude shape, but it worked well and without cutting the bearings or failing in any manner.

The shaft running up through the bottom of the safe is fitted with a shoulder half-way through the safe bottom, so that it cannot be pulled out or driven in. This prevents the use of the hole to introduce explosives. If the car is moved backward the mechanism backs also, so that switching operations do not interfere with the convenient working of the lock. Tampering with the distance mechanism is out of the question, for a robber would have to break the connection with the axle and turn the rod by hand a long time before he could release the lock bolt, and he would have no way of knowing when he had turned it long enough.

A New Smoke Consuming Device.

A new smoke-consuming device has been put on the market by the Economic Smoke Preventing Furnace Company, T. W. Harvey, President, of Chicago. It is applicable to any boiler and has been tested sufficiently to prove its ability to abate the smoke nuisance and show a saving in the fuel used. It consists of a series of air injectors arranged in an air flue over the tops of the fire doors. A sixteenth of an inch jet of steam is used to force air over the fire downward at an angle of about 30 degs. so that it will strike the fire in front of the bridge wall. In ordinary cylindrical boilers there is a combustion chamber beyond the bridge wall and back of this a wall of veticulated brick work. In water-tube boilers, however, this is not employed.

Compressed Air in the Mexican Central Shops.

The use of compressed air for various purposes is being rapidly extended in the shops of the Mexican Central in the city of Mexico. The compressor, supplying the air, was manufactured in the shops, and consists of three Westinghouse driver brake cylinders, placed vertically beneath a horizontal shaft, the pistons being driven by three eccentrics with a 9-in. throw. These eccentrics and straps are their standard locomotive castings. This compressor supplies air to the boiler shop where there is in use a complete set of the Beard pneumatic tools for punching and riveting. There are also rotary machines for drilling, tapping and screwing in staybolts, one staybolt breaking machine for breaking out old staybolts and another machine for cutting off the ends of new staybolts. Compressed air is also used in the shops for drilling, and will be used for working cranes at the different heavy machines, for jacking up engines and cars and for running special tools in the roundhouse and airbrake department.

Bids for Forgings.

Bids were opened at the War Department, at Washington, D. C., on April 1, for supplying six sets of forgings for the seven-inch siege mortar. The bid of the Bethlehem Iron Co. was $775 per set, the first set to be delivered in 90 days and the remainder at intervals of 18 days. The Midvale Company bid $800 per set, the first set to by delivered in 100 days and the remainder at intervals of 20 days.

Electrical Equipment for the Burlington & Mt. Holly Line.

The Pennsylvania Railroad Co. has given out contracts for the cars and electrical equipment for its seven-mile line between Burlington and Mt. Holly, N. J., over which the local passenger trains, now run by steam locomotives, are to be run by means of an overhead trolley. The power house will have a Westinghouse engine and generator of 300 H. P. with a Climax boiler. Three combination passenger and baggage cars will be built by the Jackson & Sharpe Co., and they will be equipped with motors of different size and arrangement. The cars will be 43 ft. long. Two of them will have two 75 H. P. Westinghouse motors each, and it is calculated that these can be run at 60 miles an hour. The third car will have four motors of 50 H. P. each. All the rails on the line weighing less than 70 lbs. per yard will be taken up and 70-lb. rails substituted. It is hoped to have the road ready for the electric cars by June 1.

Bar Iron Manufacturers Organize.

The bar iron manufacturers succeeded in perfecting an organization, to be known as the Merchants' Bar Iron Association at a meeting in Cleveland last week. It was stated that 80 per cent. of the leading manufacturers of the country were represented at the meeting.

The Heilmann Locomotives.

We have before this noted the fact that the Western Railroad of France has ordered certain Heilman electric locomotives. The precise facts are that the company has arranged with the Heilmann Syndicate for the delivery next June of two electric locomotives weighing 110 tons each, to haul 200 tons, at a speed of 40 miles an hour. These engines will be three times as powerful as the one which was tried last year. They are designed for the service between Paris and Dieppe, and the company hopes to be able next June to carry from Paris to Dieppe, in two hours, the members of the International Railroad Congress who may be going to London for the session in that city.

The Nicaragua Canal.

The President has appointed the three Commissioners to review the plans and estimates for the Nicaraugua Canal under the act of the last Congress. These appointments are Major William Ludlow, Corps of Engineers, U. S. A.; Commander Mordecai T. Endicott, Civil Engineer, U. S. Navy. and Mr. Alfred Noble, of Chicago, M. Am. Soc. C. E. Mr. Noble was the Resident Engineer in charge of the erection of the bridges at Cairo and Memphis.

THE SCRAP HEAP.

Notes.

The Pennsylvania has finished the $300,000 job of separating the grades at North Penn Junction, 7 miles east of Philadelphia, where six tracks of the Philadelphia & Reading now run beneath the Pennsylvania tracks.

The reduction of salaries on the Canadian Pacific, which was recently announced, affects only those employees who were receiving $1,000 a year or more, and only those who have fixed salaries. The trainmen, who are paid by the trip, have suffered no change.

A dam of the Grass Valley Ditch Co., near Newcastle, Col., gave way on March 27, flooding the valley below. The amount of water liberated was about 6,000,000 cubic feet. A three-span bridge of the Rio Grand Junction Railroad was washed away, as well as one smaller bridge; and a considerable length of track was swept off from the roadbed.

The Queen & Crescent has gone into the cook-book business. The General Passenger Agent is offering Mrs. John G. Carlisle's cook book for 75 cents, the regular price being $2.50. There is a chrysanthemum design on the cover, in five colors with gold.—*Exchange.*

The President and the Superintendent of the Atlantic Avenue Street Railroad Co., of Brooklyn, who were tried last week on a charge of violating the New York state 10-hour law, were acquitted. The law provides that no officer of a railroad shall "exact" more than 10 hours' labor from an employee within 12 consecutive hours; but in this case it was held that the employee had performed the service voluntarily.

The imprisonment of railroad men in Massachusetts for the illegal use of force in grade crossing fights seems to have been heard of throughout the country, and occasions of that kind now bring out various new plans for offense and defense. The latest is a fire hose, which is said to have been used effectively near Pittsburgh last week. The Baltimore & Ohio had a gang of 50 men laying track in a location which the city officials did not approve and the fire department was brought out. A stream of water was turned upon the track-layers and they were held at bay until an injunction was secured.

The piece work system, which has been used more or less in the shops of the Baltimore & Ohio for several year, but which has been largely suspended during the last year or two, has now been re-established; and, according to a Baltimore paper, all the workmen in all the shops of the company are now paid on that plan.

The Chicago railroads which recently tightened their regulations intended to keep trainmen out of liquor shops evidently mean business. A press despatch reports that the Chicago, Milwaukee & St. Paul has recently dismissed 11 engineers and 35 firemen for violation of this rule on one division. This division is one which has only recently been bought by the C. M. & St. P. A Buffalo paper reports that the Michigan Central has suspended or discharged all of its dining car conductors except one.

The latest phase of railroad competition that we have noticed is a contest between stations, to see which will ship the most freight. According to a Detroit paper the Chicago & West Michigan is in doubt whether to establish a station at Hoppertown or at Bravo; and, to determine the question, will put up a temporary shipping place and telegraph office at Hoppertown, and give the people a chance to see if they can outdo their neighbor. After the question is settled a permanent station building will be put up.

The Hudson River Navigation Company.

Articles of incorporation for a company by this name were filed in New Jersey on March 27. The capital stock is fixed at $500,000. The incorporators are: Chauncey M. Depew, H. Walter Webb, Willard Brown, Charles W. Wells, A. Barton Hepburn and George S. Bixby, all of New York City; Horace G. Young, of Albany; William G. Arkell, of Canajoharie; Ervine D. York, of Flushing, and Edward A. MacClean, of West Summit, N. J. Mr. Webb says that the new company has been formed to absorb the People's Line, which runs night boats between Albany and New York, and that two large new steamboats, to carry nothing but passengers, will be built at once for that line. It is intended to make the line more attractive, not only by putting on elegant steamboats with complete appointments, but to shorten the running time. The time of departure from the termini is now 6 p. m., and this will be changed to five or six hours later. The plans for the new steamboats are nearly completed.

Robbers and Wreckers.

A party of train robbers who attacked train No. 3 of the Cincinnati, New Orleans & Texas Pacific on the morning of March 27, near Greenwood, Ky., were met by detectives of the railroad, who had got wind of the intended attack, and two of the robbers were fatally shot as soon as they climbed upon the cars. A tramp who was stealing a ride was also shot and wounded.

At Reed's station, near Marysville, Cal., on the morning of March 30, the Oregon express of the Southern Pacific was stopped and boarded by robbers. They failed to find any plunder in the express car, and then proceeded to rob the passengers. Mr. James J. Bogard, Sheriff of Tehama county, who was a passenger in a sleeping car on the train, was aroused, and went into the car where the robbers were; as soon as he got within range he fired at one of them and killed him, but was in turn fatally shot himself. The other robbers escaped.

Passenger train No. 54 of the St. Louis, Iron Mountain & Southern was stopped by robbers at Williamsville, Mo., on the night of March 27, but by the time they had finished parleying with the express messenger some of the passengers had armed themselves and the robbers became frightened and ran away.

At Valparaiso, Ind., March 21, Peter Heick was sentenced to seven years' imprisonment for attempting to wreck a passenger train of the New York, Chicago & St. Louis railroad.

Lake Notes.

The Standard Oil Company, for which two steel bulk oil carrying barges are building by the American Steel Barge Company, is asking for bids for two more as well as a steam vessel to carry oil and tow the barges. The two building will be launched this month.

Duluth brokers have chartered some 3,500,000 bushels of wheat for delivery at Buffalo in the early part of May.

The new Erie Canal steel boat line has let contracts to the Globe Iron Works Company, Cleveland, for six boats, one steamer and five barges. Each will be 98 ft. long over all, 17.75 ft. beam and 10 ft. deep. They will run to New York from Lake ports.

Green Bay parties have contracted with the F. W. Wheeler Shipbuilding Co. to build them a large steel lumber carrier. The boat will be very large, capacity 1,500,000 ft. and with all the latest appliances.

A number of the coal shipping docks on Lake Erie will be fitted at once with the McMyler car loading machines.

The Wisconsin & Michigan Railroad has let contracts to James Davidson, Bay City, to build two 24-car freight tranfer steamers. The boats will be 316 ft. long and 44 ft. beam. The line is to be operated between Peshtig, near Menominee, to South Chicago.

Longshoremen at Duluth have agreed on wages for the season with the vessel owners, and this practically settles that there will be no strikes at any of the Lake Superior shipping centers, either by lumber or other dock handlers. Wages of lumber shovers, which are the basis of agreement, are 35 cents an hour, with an advance if freights go up. Freights are now weak at $1.75, and some lumber has been placed from Ashland at $1.45 to Buffalo.

South American Notes.

The Brazilian government is proposing to sell the state railroads of the north, believing that under private management they can be operated more economically, and will render better service to the public.

The surveys on the São Paulo branch of the Central Railroad (Brazil) have reached Taubaté.

The branch railroad to Bello Horizonte, the new capital of the state of Minas Geraes, Brazil, was formally opened to traffic on February 1st. The junction station has been named General Carneiro.

Dr. Eduardo Claudio da Silva has been appointed chief of the locomotive department of the Central Railroad, Brazil.

The Chilian senate has passed a bill granting a 4½ per cent. guarantee on the sum needed to complete Clark's Transandine Railway. The proposal to grant 5 per cent was lost by one vote. The senate bill is before the lower chamber. The senate has also passed a bill appropriating $1,000,000 for the continuation of government railroads now in course of construction.

The Chilian government has appointed two commissions, one for investigating the Nitrate Railways, having reference to the reversion of such railroads to the state, Señor Luis Aldunate being chairman, and another to report on the Railroad Law now in force, with a view to its reform, the Director General of Railroads being ex-officio chairman.

Iron Ore Matters.

The first Lake Superior iron ore charters of the season closed, are for 300,000 tons of ore from the Oliver mine on the Mesaba range, from Duluth to Fairport, for shipment to the furnaces of the Carnegie and Oliver companies. The contract runs through May, June, July and August, and is at 75 cents a ton, or 5 cents less than the figures paid from Duluth at the beginning of 1894. This practically settles the rate from the ports of Duluth. Two Harbors and Ashland at 75 cents, from Marquette at 65 cents, and from Escanaba at 50 cents for the reason. Indeed a little ore has been placed from Escanata at 55 cents. It is expected that large sales of ore will be announced in a few days at about 15 cents better than a year ago for Bessemer grades and at the average prices of 1894 for non-Bessemer.

It is estimated that mining companies in the Lake Superior region have in stock of ore won during the winter about 3,500,000 tons. This is about half what they can get out for shipment during the year. Besides these underground mines there can be mined at the stripping crater mines of the Mesaba after the opening of navigation between 3,300,000 to 3,600,000 tons. So there is likely to be no shortage of ore, and a condition of oversupply is likely to be continued. At the mines of the Vermilion range the Minnesota Iron Co. has 600,000 tons stocked. It is expected that the Duluth, Missabe & Northern road will add largely its rolling stock during the early season.

Coastwise Trade.

Interviews with officers of the companies engaged in coastwise shipping are printed in the *Journal of Commerce.* The best that can be said is that business is improving slowly and for March was as good as, in some cases slightly better than last year. The lines to New England points report the greatest gain in westbound business; the lines down the coast gain most in southbound business.

University of Wisconsin Lectures.

The following is a list of the excellent lectures delivered during March before the engineering students of the University of Wisconsin; March 8 and 9, by Frederick H. Lewis, Consulting Engineer, member of Booth, Garrett & Blair, of Philadelphia. on "Specifications and Tests of Structural Steel and Specifications and Tests of Cement." March 15, by Lyman E. Cooley, Trustee Sanitary District, Chicago, "A Deep Water Way from the Atlantic to the Gulf via Great Lakes." March 22, by L. F. Losee, Superintendent C. & P. Division Pennsylvania lines west of Pittsburgh, "Emergencies Arising in the Operation of Railroads."

R. P. I. Non Resident Lectures.

Theodore N. Ely, C. E., Chief of Motive Power of the Pennsylvania Railroad Company and of the class of 1866 of the Rensselaer Polytechnic Institute delivered a lecture entitled "Some Things Important for a Successful Professional Career," before the students of that institution at Troy on March 29.

Astonishing the Natives at New London.

One of the big locomotives just received by the New York, New Haven & Hartford Railroad was put to test on March 26, when it started from Harlem River for Boston with 1,000 tons of rails. The train was made up of 51 cars each having 40,000 lbs. The locomotive had a hard stuggle over the trestle from Shaw's Cove at New London across the Thames River bridge where the grade is steep and the curves sharp, but the engine pulled the train, without a stop. The railroad iron is for the Nantasket Beach railroad.—*Press Despatch.*

Transatlantic Steamship Profits.

The Chairman of the Cunard Co., in his remarks at the company's annual meeting, said that the policy of building the Lucania and Campania had been singularly successful and cited as evidence the increase of £84,000 in the revenue from first-class passengers. There were heavy losses in the revenue from steerage and second cabin passengers, which probably were not in any way connected with the operations of the two latest and greatest steamers. But the retirement of some companies engaged in the transatlantic service, and the very small dividends paid by some of the surviving companies, might well raise a question as to the profit of carrying passengers across the ocean in six days. Companies that would not undertake to do this have been driven out of the business, but the companies that do undertake to do it incur very heavy expenses.

LOCOMOTIVE BUILDING.

The Des Moines Union Railroad is about to order two or three locomotives.

The Tehauntepec Railroad will soon place an order for two or three locomotives.

The Calumet & Blue Island Railroad, a freight railroad at Chicago, is in the market for several heavy locomotives.

The Baldwin Locomotive Works have just shipped three freight locomotives for the Agua Santa Railroad, and two switching locomotives for the Antofagasta Railroad, and have contracts for three freight. two passenger and one switching locomotive for the Antofagasta road. Both railroads are in Chili, S. A.

The Southern Railway Company has placed an order with the Richmond Locomotive Works for 14 locomotives. Eight of these are to be consolidation locomotives, with cylinders 20 in. × 26 in., for hauling fast freight, and six are to be 10-wheelers, with cylinders 20 in. × 24 in., for passenger service. The type of the passenger locomotives is that used in hauling the Florida special. The works had already received orders from the Southern Company since its reorganization for seven locomotives.

CAR BUILDING.

The Tehauntepec Railroad, in Mexico, has recently ordered 12 passenger cars in this country.

The Choctaw, Oklahoma, & Gulf Railroad has prepared specifications for coal cars, and will probably order several hundred shortly.

The American Car Co., of St. Louis, Mo., is very busy, having a number of orders for cars from Eastern and local railroads, and the works are being run to their full capacity.

Messrs. Flint, Eddy & Co., of New York City, have ordered 50 box cars from the Bloomsburg Car Works for shipment to South America. They have recently shipped 200 coal cars and 25 platform cars.

The reported order of the Delaware & Hudson Canal Co. for 150 freight cars has been confirmed. As stated last week, the order is for box cars and has gone to the Jackson & Woodin Mfg. Co., of Berwick, Pa.

The number of refrigerator cars in service in this country has increased very largely in recent years, and some evidence of the large proportion of these cars now built is brought out in the statement that 2,400 refrigerator cars were built by the Wells & French Co., of Chicago, during the past 15 months, probably the largest number ever built in the same period.

The Evansville & Terre Haute Railroad has just received the last of the cars ordered last January from the Ohio Falls Car Company. This order included 75 box cars of 50,000 lbs. capacity, with Westinghouse air-brakes, Tower coupler and the American continuous draft rigging. This is the only new equipment likely to be purchased by the company for a considerable time.

The Pennsylvania Company has this week awarded the contract for 1,000 hopper bottom coal cars. The Barney & Smith Car Co., of Dayton, will build 500, the Union Car Co., of Buffalo, 100, and the other 400 will be built at the company's shops at Altoona. The first named firm is to build 500 more of the same pattern at the same price should the company want them.

BRIDGE BUILDING.

Atlanta, Ga.—The Edge Moor Bridge Co., of Wilmington, Del., has bid $22,200 on the contract for the steel highway bridge over the railroad tracks at Broad street, this city. The Bridge Committee of the City Council has recommended that the contract be let to this company.

Broad Ripple, Ind.—The county commissioners of Marion Co., Indiana, propose to construct a new steel bridge at this point, to replace the present gravel road bridge.

Casselman, Ont.—The iron bridge over the Nation River at this place, is to be rebuilt at once.

Central of Georgia.—The Edge Moor Bridge Works are building the Flint River Bridge, consisting of two Pratt trusses, 110 ft. long each.

Choctaw, Oklahoma & Gulf.—Bridge contracts aggregating 1,000 tons have recently been placed with the Phœnix Bridge Co. by this railroad company as follows: Crossing of South Canadian River, two through pin-connected spans, 309 ft. long each; crossing of Coal Creek, five half through lattice girder spans, 100 ft. long each; crossing of Salt Creek, one deck lattice girder span, 100 ft. long; also two plate girder bridges, 30 ft. long each, and one 40 ft. long. All single track. The contract calls for delivery early in May.

Cincinnati, O.—A 550-ft. viaduct on West Eighth street, this city, will shortly be built. Proposals for the the superstructure and also for excavation, abutments, approach walls, etc., will be received until April 16.

Cleveland, O.—The County Commissioners are considering a proposal to build a bridge over Nine-Mile Creek at St. Clair street.

Desoronto, Ont.—The Hastings County Council has awarded the contract of O'Brien's Bridge to the Waddell Bridge & Engine Co., of Trenton, Ont., at the price of $6,120.

Dundas, Ont.—The by-law to authorize the raising of $5,100 for the building of an iron bridge has been carried.

East Liverpool, O.—The contract for a bridge across the Ohio River at this place has just been let to the Wrought Iron Bridge Co., of Canton, O., at a cost of $275,000.

Easton, Pa.—The piers for the new steel bridge across the Delaware River, from Easton to Phillipsburg, have been contracted for by J. W. Hoffman & Co., of Philadelphia, Pa.

Edmonton, N. W. T.—The Dominion Government will build a steel bridge over the river at this place, and work will be commenced at once.

Erie, Pa.—Plans are being prepared, and bids will soon be asked, wanted for the opening of Ash street, Erie, across the Lake Shore and Pennsylvania tracks. The crossing will be made by depressing the street, the tracks to be carried on deck plate girders of 40 feet span. Of the preliminary estimate of $25,000, the city has agreed to pay $9,000.

Gladstone, Mich.—Press reports state that the contract for an iron bridge over the Escanaba River, near this city, has been let to the Gillette-Herzog Co., of Minneapolis, for $5,700.

Glendive, Mont.—Proposals will be received until May 15 by James McCormick, County Clerk, for building a pivot swing bridge over the Yellowstone River at a cost of $39,000.

Greenfield, Mass.—It is said that plans are being prepared for a bridge over the Connecticut River. The structure will be a steel truss bridge 650 ft. long, and will be used by a proposed electric road.

Hartford, Conn.—The new Capitol Avenue bridge at Hartford, will be built by the Berlin Iron Bridge Co., of East Berlin, Conn., and will consist of two span plate girder, each 82 ft. with a roadway 25 ft. in width, and two sidewalks.

Indianapolis, Decatur & Western.—Contracts for bridges have been let to the Union Bridge Co., as follows: No. 5, Eagle Creek, two through, rivited lattice spans, each 100 ft.; No. 12, Big White Lock Creek, one deck, pin-connected span, 130 ft.; No. 23, Ell River, one deck, pin-connected span, 130 ft.; No. 38, Racoon Creek, two through, pin-connected spans, 125 ft.; No. 55, Raccoon Creek, one deck, pin-connected span, 130 ft.; No. 71, Leatherwood Creek, one deck plate girder span, 70 ft.; No. 78, Leatherwood Creek, one through pin-connected span, 130 ft.; No. 83, Wabash River, one through pin-connected span, 166 ft.; three through pin-connected spans, each 164 ft., two deck plate girder spans, each 70 ft.

Indianapolis, Ind.—Bids will be received April 9 for a 78-ft. bridge over Pleasant Run at Raymond street; also for a 66-ft. bridge over the canal at Pratt street by Charles C. Brown, City Engineer.

Jefferson City, Mo.—A bill has been passed providing for the construction of a toll bridge upon the Winner bridge piers at this city.

Kansas City, Mo.—A viaduct from the Southwest Bluffs is under consideration at an estimated cost of $25,000.

The Kansas City Elevated Railway Co. has recently ordered a 50-ft. plate girder bridge of the Pittsburgh Bridge Co. It is a double-track structure.

Kingston, Ont.—The bridge connecting the city with the township of Pittsburg will be rebuilt. An iron or steel structure will likely be constructed.

Knoxville, Tenn.—The proposed stone bridge across the Tennessee River, at the foot of Gay street, will have eight spans. Four of the nine piers will be 40 ft. square, and five will be 15 ft. × 40 ft. Over each pier will be seven small archways.

Lake Erie & Western.—A bridge contract for three through, pin-connected spans, 158 ft. long each and two deck plate girder spans, 60 ft. long each, has been placed with the Edge Moor Bridge works.

Lindsay, Ont.—The Town Council have decided the building of an iron bridge over Connell's Creek, on the township line, between Eldon and Thorah.

London, Ont.—The City Council will replace the wooden bridges on the London & Port Stanley railroad with iron structures.

Montevallo, Ala.—A new steel bridge will be built over Shoal Creek, to replace the existing wooden structure.

Monticello, Ill.—It has been decided by the highway commissioners to build a bridge across the Sangamon River in Monticello township.

New Westminster, B. C.—A railroad and traffic bridge is to be constructed across the Fraser River by the City Council, the estimated cost including the substructure is $200,000.

New York & New England.—Only a few small bridges will be built by this company this season, contracts for most of which are placed as follows: Bridge, No. 64, girder span with draw machinery for Connecticut River crossing; No. 77, Laurel street, Waterbury, Conn., and Park avenue, Hartford, Conn., constructed jointly with the N. Y., N. H. & H. R. R., with the Pennsylvania Steel Co.; bridges No. 59½ and No. 87, with the Phœnix Bridge Co.

Ogdensburg, N. Y.—Proposals will be received until April 12 for building a 220 ft. steel plate girder bridge over the Oswegatchie River.

Ottawa, O.—The Findlay, Fort Wayne & Western Railroad is about to build a bridge across the Blanchard River, composed of two, through, riveted, lattice-girder spans 132 ft. long each. The Toledo Bridge Co. has the contract for the steel superstructure. The plans have been prepared by Alfred Boller, of New York city.

Philadelphia.—The masonry and general stone work on the new city bridge over the Reading Railroad at the junction of Sixth street and Allegheny avenue was commenced last week. Jones & Pollard are the contractors. The superstructure above the masonry is to be of steel. It will be 256 ft. long by 60 ft. wide, crossing the railroad 24 ft. above the top of the tracks. The main girder will be 122 ft. 10½ in. long by 9 ft. 6½ in. in depth, and will be one of the longest of its kind in the city. The bridge is to cost about $89,000.

Providence, R. I.—The contract for the Red River bridge has been awarded under re-letting to the Union Bridge Co. On the first letting the Hawkins Iron Works, of Springfield, were the lowest bidder. The structure will consist of a draw span 200 ft. long and two approach spans 100 ft. long each.

Richmond, N. Y.—The commissioner of highways has been instructed to build a new iron bridge over the Whitestone Brook.

Rock Island, Ill.—At the last session of Congress an appropriation of $100,000 was made for rebuilding the superstructure of the government bridge at this place.

Rumford Falls & Rangeley Lake.—The Boston Bridge Works have recently shipped bridges to cross the Androscoggin and Swift Rivers, aggregating 250 tons.

Sharpsburg, Pa.—Plans have been drawn for the rebuilding of the Sharpsburg and Lawrenceville bridge. The capital stock of the bridge company will be increased from $80,000 to $200,000.

St. Louis, Mo.—A bridge is proposed over Richland Creek, on West Main street, the estimated cost of which is $10,000.

Ste. Anne de la Parade, Ont.—The work of construction will be commenced on an iron bridge for vehicles here to replace the one swept away by the floods last spring. The cost is estimated at $30,000.

Toledo, O.—The Bridge Committee of City Councils has decided to recommend the acceptance of the Toledo Bridge Co.'s plans for a deck bridge 18 ft. clearance, and costing $185,000.

Trenton, N. J.—The Shabakong bridge, on the Lawrenceville road, which was recently wrecked by a freshet, will be replaced by a new 60-ft. iron bridge 20 ft. in width.

West Superior, Wis.—The plans and specifications for the proposed viaduct on Belknap street, over the Great Northern tracks, West Superior, have been rejected by the city engineers, on the ground that the bridge would be too light for the traffic.

Winchester, Ohio.—A new bridge will shortly be built over Turkey Run, on the Winchester and Fincastle road, near this place.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Concord & Montreal, $1.50, on stock classes 1, 2, 3, and 4, payable May 1.

Delaware, Lackawana & Western, quarterly, 1¾ per cent., payable April 20.

Freehold & Jamesburg Agricultu al, 3 per cent. in cash, April 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chicago & Grand Trunk, annual, Chicago, April 10.

Cincinnati, Saginaw & Machinaw, annual, Saginaw, Mich., April 16.

Elmira & Lake Ontario, annual, Room 15, 20 Whitehall street, New York City, May 2.

Lake Shore & Michigan Southern, annual, Cleveland, O., May 1.

Michigan Central, annual, Detroit, Mich., May 2.

New York Central & Hudson River, annual, Albany, N. Y., April 17.

New York, Chicago & St. Louis, annual, Cleveland, O., May 1.

Pittsburgh, Cincinnati, Chicago & St. Louis, annual, Pittsburgh, Pa., April 9.

Toledo, Ann Arbor & North Michigan, annual, Toledo O., April 17.

Union Pacific, annual, Boston, Mass., April 24.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Car Accountants' Association* will hold its next meeting at the Palace Hotel, San Francisco, Cal., on April 16, 17, 18 and 19.

The *Association of Railroad Air-Brake Men* will hold its next annual meeting in St. Louis, Mo., from April 9 to 11. The headquarters will be at the Lindell Hotel.

The *General Baggage Agents' Association* will meet in Houston, Tex., April 10.

The *American Railway Association* will meet at the Planters' Hotel, St. Louis, Mo., on April 17.

The *Master Car Builders' Association* will hold its annual convention at Thousand Islands, Alexandria Bay, N. Y., commencing June 11.

The *Master Mechanics' Association* will hold its convention at the same place, commencing June 17. Applications for rooms for both conventions should be made to J. B. Wistar and Charles W. Crossman, both at Thousand Islands, Alexandria Bay, N. Y.

The *International Railway Congress* will meet at the Imperial Institute, London, England, beginning June 26.

The American Society of Civil Engineers will hold its annual convention at Nantasket Beach, commencing June 18.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October, at 10 a. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 1736–1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The *Association of Civil Engineers of Cornell University* meets on Friday of each week at 2:30 p. m., from October to May, inclusive, at their association rooms in Lincoln Hall, Ithaca, N. Y.

Boston Society of Civil Engineers.

The annual meeting of the Boston Society of Civil Engineers was held at its rooms, 36 Bromfield street, on Wednesday, March 20, 1895, at 7.45 o'clock p. m. President Wm. E. McClintock in the chair, 89 members and visitors present.

Messrs. William M. Bailey, Arthur Bartlett, Herbert E. Gage, Nathan G. Grover, George H. Hamlin, Henry G. Hunter, Henry A. Nash, Jr. Arthur J. Ober, Arthur G. Pierce, Bertrand T. Wheeler were elected members of the society.

The annual reports of the Boards of Government and the Treasurer were presented, from which it appeared that the past year has been a prosperous one for the society. A net gain of 32 has been made in its membership. The present total membership is now 354.

The Secretary read a communication from a committee on "Standard Gages for Thickness" of the American Society of Mechanical Eegineers requesting the co-operation of this Society in the effort to abandon the system of arbitrary gages and to secure the adoption of a decimal system giving the actual thicknesses and diameters of the pieces. After a short discussion it was voted to refer the communication to the Board of Government, to report back to the Society what action was desirable.

Mr. George A. Carpenter presented the report of the committee appointed to prepare a memoir of Mr. Lincoln C. Haywood, late Town Engineer of Lincoln, and it was read and accepted.

Mr. A. F. Noyes presented the report of the committee to prepare a memoir of Mr. Hiram Nevons, late Superintendent of the Cambridge Water Works, which was also read and accepted.

The result of the election of officers was as follows: President, Albert F. Noyes; Vice-President (for two years), Dexter Brackett; Secretary, S. Everett Tinkham; Treasurer, Edward W. Howe; Librarian, Frank L. Locke; Director (for two years), Richard A. Hale.

The President called attention to the fact that at the close of the meeting, one of the members, Mr. Henry Manley, would retire from the Board of Government after 15 years of continuous service, and spoke in very complimentary terms of the faithful manner in which Mr. Manley had served the Society as Treasurer, President and Director. In response to the hearty applause which followed the remarks of the President, Mr. Manley thanked the members for their expression of their appreciation of his efforts in the interest of the society. He spoke of the pleasure his connection with the Society had always given him and of the pride he took in its prosperity, and closed by extending to the Society his best wishes for its continued success.

President William E. McClinlock then delivered his annual address.

At the close of the formal address, Mr. McClinlock had thrown upon the screen a large number of lantern views showing the work done by the Massachusetts Highway Commission in the construction of state roads. Views were also shown of the roads and other objects of interest in Bermuda which he had recently visited.

American Society of Civil Engineers.

On the evening of April 3d a paper by H. H. Campbell, M. Am. Soc. C. E., on "Specifications for Structural Steel," was presented and discussed in connection with the report of the Committee on "Uniform Methods of Testing Materials used in Metallic Structures and on Requirements for these Materials to Further Improve the Grade of Such Structures." This report will be found on page 55 of Proceedings for January, 1895, which has already been mailed to members. An abstract of Mr. Campbell's paper appeared in the *Railroad Gazette* of March 22.

On the evening of April 17th a paper on "Bacteria and other Organisms in Water," by John W. Hill, M. Am. Soc. C. E.., will be read and discussed. Advance copies of this paper will be sent to all members who have notified the Secretary that the subject treated is one in which they are specially interested.

PERSONAL.

—Mr. W. W. Pope has been appointed Auditor of the Gulf, Colorado & Santa Fe, in place of Mr. E. Lutkin, resigned.

—Mr. J. M. Norman, Assistant General Superintendent of the Louisville, Evansville & St. Louis Consolidated Railroad Company has resigned, and the office will be abolished.

—Mr. T. A. Switz has been appointed Purchasing Agent of the Minneapolis, St. Paul & Sault Ste. Marie Railroad, vice Mr. W. Watkins, who resigned to accept other service.

—Capt. R. L. Cobb, who has been Chief Engineer of the Ohio Southern Railroad for the last several years, and had in charge the extension of that line into Lima, O., has recently resigned that office.

—Mrs. H. B. Ledyard, wife of the President of the Michigan Central Railroad, dropped dead at Chene and Champlain streets, in Detroit, Mich., March 30. The cause of death is given as heart disease.

—Mr. T. W. Burrows, a railroad man of considerable experience as trainmaster and Superintendent on various railroads, has recently been appointed Sales Manager of the Mozier Safety Signal Company of Indianapolis.

—Dr. William Taussig, President of the Terminal Railroad Association of St. Louis, sailed from New York last Saturday for an extended trip through Europe. A special train was run by the Big Four road, carrying Dr. Taussig from the Union Station, over the new elevated entrance to the station, and the Merchant's Bridge, so that he could be the first passenger to use the new entrance to the station from the east.

—Mr. Seymour N. Forbes, who has for a long time been in charge of the freight business of one of the large St. Louis merchants, has been made Secretary of the freight bureau of the Merchants' Exchange of that city.

—Mr. A. C. Gates, for several years in the engineering department of the Pennsylvania at Erie, has been made supervisor upon the Western New York & Pennsylvania, upon the Buffalo end of the Pittsburg division.

—Mr. J. B. Yohe has been appointed Superintendent of the Pittsburgh & Lake Erie. The office of Master of Transportation, formerly held by him, has been abolished, and its duties will be performed by the Superintendent.

—Mr. H. L. Winchell, Assistant General Passenger Agent of the Kansas City, Fort Scott & Memphis, has been appointed General Passenger Agent of the Union Pacific, Denver & Gulf, to succeed Mr. Frank B. Semple, resigned.

—Mr. R. Price Williams, an English railroad engineer of distinction, widely known as a student of railroad economics, and from his services to Australian railroads, will shortly visit America to make a report on some of the Chicago railroads.

—Mr. E. M. Humstone, of Hartford has been appointed Assistant Superintendent of the Philadelphia, Reading & New England Railroad, vice Mr. H. D. Masters, resigned. Mr. Humstone fills at present the office of Master Mechanic.

—Mr. S. H. H. Clark, of the Union Pacific authorizes an explicit and emphatic denial of the story that he is about to retire from the Presidency of that road and return to the Presidency of the Missouri Pacific. The daily newspapers have been busy with the rumor for some weeks.

—Engineer Berry and Conductor Campbell of the Eastern Minnesota railroad have been presented by the survivors of the Hinckley fire each with a gold medal in recognition of their services in saving the people of Hinckley when that town was on the eve of destruction by the forest fire of September 1, last.

—Captain J. G. Mann has been promoted from the position of Assistant General Manager of the Mobile & Ohio to that of General Manager, with headquarters at St. Louis. Captain Mann went to the Mobile & Ohio about six months ago, being then Assistant Chief Engineer of the Southern lines of the Illinois Central.

—Mr. John W. Cary, General Counsel for the Chicago, Milwaukee & St. Paul, died at Chicago last week. Mr. Cary had for 36 years been the legal adviser of the Chicago, Milwaukee & St. Paul Railroad Company. In 1887, when he was general solicitor of the company, the board of directors created the office of general counsel, and he was chosen for the position, which he continued to fill until his death.

—Mr. W. H. Scriven, formerly Engineer of Maintenance of Way on the Cleveland & Pittsburgh division of the Pennsylvania lines, has been promoted to the position made vacant by the recent promotion of Mr. W. H. Potter to the superintendency of the Toledo division. Mr. Walter S. Newhall, at present Engineer of Maintenance of Way on the Toledo division, has been transferred to the Cleveland & Pittsburgh.

—Mr. D. Pratt Wright, M. E., of Berkeley Springs, W. Va., has just sailed for a trip to the Isthmus of Panama, Cuba and Jamaica for business and pleasure. His chief business object is to look into the markets for American machinery and machine tools. Mr. Wright was at one time Assistant Master Mechanic on the Erie, later Master Mechanic on the New York & New England, and afterward Master Mechanic on the Panama Railroad.

—Mr. S. D. Coykendall has purchased a controlling interest in the Ulster & Delaware Railroad Company, and at a meeting of the directors at Kingston, N. Y., on March 30, he was elected President of the company. The controlling interest in the railroad has been held by the Thomas Cornell estate. Mr. H. G. Young, Vice-President of the Delaware & Hudson, has been President since the death, in 1893, of his brother, Mr. Edwin Young, who was the attorney of the Cornell estate.

—Mr. M. V. Meredith has recently resigned the office of Superintendent of the Saginaw, Tuscola & Huron railroad in Michigan and the duties of that position have been assumed by the General Manager, Mr. Sanford Keeler, who was recently appointed to that position, having formerly been General Superintendent of the Iron Range & Huron Bay railroad. Mr. Meredith has been Superintendent of the railroad since October, 1888, and was formerly Division Superintendent on the Flint & Pere Marquette.

—Capt. Thomas W. Mason, who for the past four years has been the ablest member of the North Carolina Railroad Commission, retired on April 1, and is succeeded by Otho Wilson, a Populist elected by the last legislature. There is now no lawyer on the Commission, Wilson being a nurseryman, Beddingfield a farmer, and Major J. W. Wilson a civil engineer. Captain Mason, who received the complimentary vote of the Democratic members of the legislature last January for United States Senator, will resume the practice of law.

—Mr. Emerson W. Judd, for several years connected with Raymond & Whitcomb, is now assistant to Mr. A. C. Harvey, New England agent of the Great Northern Railway and the Northern Steamship Co., with office at 211 Washington street, Boston. The Great Northern, with its two magnificent steamers, the *North West* and the *North Land*, which will make a semi-weekly fast passenger service from Buffalo to Duluth this summer, is going into the "personally-conducted" tour business quite extensively. Mr. Judd has had long experience in this kind of work.

—Mr. W. S. Chadwick, whose term as President of the Atlantic & North Carolina seemed a few weeks ago likely to be summarily ended by the present fusion Populist-Republican Legislature of North Carolina, is, after all, to retain his office. The majority of the directors of the railroad are nominated by the state, and since the present legislature came into power with the usual Democratic majority overcome, they have removed a number of Democratic state officers, including the members of the railroad commission. The plan to change the administration of the Atlantic & North Carolina Railroad failed on the last day of the session because a quorum could not be secured.

—Mr. James Murray, whose death in London at the age of 83 years occurred recently, was an American engineer, for many years associated with the late Ross Winans. He was Master Machinist of the Baltimore & Ohio Railroad 50 years ago and had his office at Mt. Clare. He formed a partnership with Mr. Henry R. Hazlehurst, of Ellicott City, in 1845, and established the Vulcan Iron Works & Machine Shops at Baltimore. Ten years later Mr. Murray became interested with Mr. Ross Winans in the building of the Winans cigar ship and was sent to Europe by Mr. Winans. He was identified with all of Mr. Winan's works abroad and had been a resident of London 20 years.

—Mr. W. W. Finley, General Traffic Manager of the Great Northern road, has been elected Commissioner of the new Southern States Passenger Association, and will assume his new duties at Atlanta on April 15. Mr. Finley states that family considerations have decided him to accept the office, and that he leaves the Great Northern with regret, his position with that company having been very agreeable and his relations with his superiors always pleasant. Mr. Finley has been with the Great Northern since May, 1892. Before that he had been Chairman of the Western Passenger Association for three years, and before that he was at Kansas City as Chairman of the Trans-Missouri Traffic Association.

—Mr. Joseph Higgins, who died at Rome, N. Y., on March 29, at the age of 77, was station agent of the Utica & Syracuse Railroad at that place about 55 years ago, when one of the duties of the agent was to fill the tank by a hand pump. Mr. Higgins sometimes had to work all night at the pump in order to have a sufficient supply in the tub for the locomotives. In the absence of a telegraph he kept a spy glass so as to give the people of the village early notice of the expected arrival of trains. After six years service as station agent Mr. Higgins was promoted to be section master, in which position he had a 3-wheeled hand car; which, evidently was not so successfully "pushed" as have been some 3-wheeled cars since.

—Mr. E. Clark, the veteran General Freight Agent of the New York Central & Hudson River, has resigned that office, on account of continued ill health. Mr. W. L. Kingman, Assistant General Freight Agent is promoted to the vacancy. Other promotions are: Mr. George E. Terry, Division Freight Agent at Buffalo, to succeed Mr. Kingman as Assistant General Freight Agent and Mr. Chauncy Depew, a nephew of President Depew, to the Division Freight Agency at Buffalo. Mr. Clark, the retiring General Freight Agent, has been with the New York Central, throughout his career. He was first employed at Buffalo, where he was a clerk. He became Local Freight Agent at Buffalo, and later he was made General Western Freight Agent. When the late James H. Rutter became General Traffic Manager, he was appointed to the position which he has now resigned. Mr. Kingman has also been connected with the Central road for a long period. He held the position of General Coal Agent until about 1892 when he succeeded Samuel Goodman as Assistant General Freight Agent.

ELECTIONS AND APPOINTMENTS.

Boston & Maine.—Superintendent Perkins, of the Eastern division, announces the following changes in the road department: G. L. R. French to be Roadmaster to fill the vacancy caused by the resignation of A. C. Stevens, with headquarters at Beverly; Daniel F. Snow, Assistant Roadmaster; Henry F. Russell, Superintendent of Bridges and Buildings, with headquarters at Salem, and Albert B. Prebble, Assistant Auditor.

Canadian Pacific—J. H. Van Zile, Superintendent of the Brownville division, has had added to his duties the superintendency of the Aroostook and New Brunswick division, heretofore in charge of Division Superintendent John Stewart of Woodstock, and the new headquarters will be at McAdam Junction, N. B.

Chateaugay.—F. M. Johnson has been appointed Superintendent, with office at Plattsburgh, N. Y., vice M. L. French.

Chesapeake, Ohio & Southwestern.—The annual meeting of the stockholders was held in Memphis on April 2. With the exception of Holmes Cummings, who has removed to Texas, all the members of the old board were re-elected Mr. Gilleas was chosen to fill the vacancy occasioned by Mr. Cumming's resignation. Mr. Gilleas is the Assistant General Superintendent of the Illinois Central and Yazoo & Mississippi Valley Roads. W. J. McBride is Passenger and Ticket Agent, with office at Louisville, Ky. S. G. Hatch has been appointed District Passenger and Ticket Agent, with office at Memphis, Tenn.

Chicago, Rock Island & Pacific.—John W. Fallon, of Houston, Tex., has been appointed Southwestern Traveling Freight Agent of the Chicago, Rock Island & Pacific, with headquarters in Houston, Tex. He has recently been Traffic Manager of the Texas Trunk road.

Chicago & Alton.—The annual meeting was held in Chicago on April 1. T. B. Blackstone, John B. Drake, and Morris K. Jesup were re-elected directors for three years. There was no election of officers.

Cleveland, Akron & Columbus.—The Directors have chosen the following officers: George W. Saul, President and General Manager; Frederick E. Rittman, Treasurer; S. Y. McNair, Secretary and Auditor; George A. Morrison, Assistant Secretary and Assistant Treasurer; J. H. Barrett, General Superintendent; L. Rush Brockenbrough, Traffic Manager.

Cleveland, Lorain & Wheeling.—The freight and passenger departments of the road are to be divided, J. E. Terry continuing at the head of the former and M. G. Carroll having been appointed General Passenger Agent.

Columbus & Cincinnati Midland.—At the recent annual meeting the following were re-elected: Directors, Charles F. Mayer and Orland Smith of Baltimore; W. W. Peabody, Cincinnati; James Kilbourne, Charles Parrott, John Joyce, R. E. Sheldon, Ralph Lazarus and T. Ewing Miller, Columbus; President, Orland Smith; Secretary, S. P. Peabody; Treasurer, W. H. Ijams, Baltimore.

Lehigh Valley.—Galen B. Owens has been appointed Supervisor, vice John M. Rahm, resigned. He will have charge of all tracks of the Pennsylvania & New York Division in Pennsylvania. A. A. Read, Roadmaster of the Mahanoy division, has been appointed Roadmaster of the Mahanoy, Beaver Meadow and Hazleton divisions, vice I. O. Mandeville, Roadmaster of the Beaver Meadow and Hazleton divisions, resigned.

Louisville, Evansville & St. Louis.—R. M. Allen, Passenger Agent of the Chicago, Peoria & St. Louis, has resigned to accept the office of Assistant General Passenger Agent of this road.

Louisville & Nashville.—W. S. Martin has been appointed Superintendent of the Louisville division and branches, vice W. P. Pike, deceased.

Daniel Breck has been appointed Superintendent of the Owensboro & Nashville Division, vice W. S. Martin, transferred.

Kemp Ridgely, Division Passenger Agent at Memphis, has been appointed General Northern Passenger Agent, with headquarters at Chicago, filling the vacancy caused by the death of George L. Cross. Max Bumgarten, formerly City Ticket Agent at Memphis, has been promoted to the division passenger agency.

Missouri Southern.—The title of P. E. Wilson has been changed from General Superintendent to that of General Manager. J. B. Burkholder is General Freight Agent. The office of the General Manager is at Leeper, Mo., and of the General Freight Agent at St. Louis.

Monterey Mineral Railway & Terminal Co.—The officers of the company are: William Johnston, President, Liverpool, England; C. K. Lord, Vice-President, and Gen. John Gill, Secretary and Treasurer, Baltimore, Md.; W. H. Wentworth, Chief Engineer, and E. J Wiggins, Superintendent, both of Monterey, Mex.

New York, Pennsylvania & Ohio.—The two divisions between Kent, O., and Salamanca, N. Y., have been consolidated, in charge of Superintendent Belknap, now of the Meadville and Kent division. The title of Superintendent Matson, of the Salamanca division, will be changed.

Norfolk & Western.—The title of W. C. Bullitt has been changed from Vice-President in charge of traffic department to that of Traffic Manager, his office remaining at Philadelphia.

Ocean Steamship Co. of Savannah.—J. P. Beckwith, previously General Agent Central Railroad of Georgia System, at Savannah, has been appointed General Freight and Passenger Agent, with offices at Pier 35 (New) North River, New York.

Panama.—At the annual meeting of the company in New York City on April 1, Messrs. George Wadley and Charles Einsiedler were elected directors in the places of Robert A. Cheesebrough and S. R. Probasco. No changes were made in the executive officers. The present directors are John Newton, Charles Coudert, George Whaley, E. A. Drake, Ernest L. Oppenheim, Charles Einsiedler, Xavier Boyard, Samuel M. Felton, J. Edward Simmons, William B. Franklin, J. H. Parker, W. N. Cromwell and Vernon H. Brown, of New York City.

Pennsylvania Lines West of Pittsburgh.—J. M. Kimball has been appointed General Agent of the Erie & Ashtabula Division of the Northwest System. His office will be at Erie, Pa. H. W. Byers has been appointed Superintendent of the Erie & Ashtabula Division, vice Mr. Kimball, transferred. His office will be at Lawrence Junction, Pa.

Pittsburgh & Lake Erie.—J. B. Yohe has been appointed Superintendent of the railroad and leased lines, taking effect April 1. The office of Master of Transportation has been abolished, and the duties performed by the Master of Transportation will, from and after April 1, be performed by the Superintendent.

Plant System.—L. A. Bell has been appointed Division Passenger Agent of the Alabama Midland Railway, with office at Montgomery, Ala.

Rath & Hammondsport.—Monroe Wheeler has been elected Secretary, with office at Hammondsport, N. Y., vice F. M. McDowell.

Saginaw, Tuscola & Huron.—M. V. Meredith has resigned his position as Superintendent of this company, and the duties heretofore performed by him are hereby devolved on the General Manager, Sanford Keeler, and the office of Superintendent is abolished

Seaboard Air Line.—G. W. Eaves, formerly of Richmond, Va, has been made Foreman of the Seaboard Air Line shops at Raleigh, N. C., and George Wombel, Assistant Foreman. The position of Master Machinist at these shops has been abolished. David M. King, of Raleigh, N. C., has been appointed Traveling Engineer of the road.

St. Louis Southwestern.—Assistant General Freight Agent W. H. Quigg has been transferred from Tyler, Tex., to Pittsburgh, Pa., as Commercial Agent. The former office has been abolished.

Tennessee Coal & Iron Railroad Co.—Messrs. John G. Moore, J. Edward Simmons, J. J. McComb, and James Swann, of New York City, were elected directors of the Tennessee Coal, Iron & Railroad Company at the annual meeting at Tracy City, Tenn., on April 2.

Ulster & Delaware.—Harry S. Coykendall, son of S. D. Coykendall, the newly elected President of the company, has been appointed Treasurer of the company in place of Thomas C. Hornbecker, resigned. His office will be at Kingston, N. Y.

Western New York & Pennsylvania.—A. C. Gates, formerly of the Erie, has been made roadmaster of this road at Brocton, in place of the late John McGuire.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Baltimore Belt.—The Belt Railroad and tunnel of the Baltimore & Ohio Railroad at Baltimore was not opened for regular freight and passenger traffic on March 31 as was expected. The officials decided that it would be better to delay the formal opening until April 7. The electrical equipment of the tunnel will not be completed for several weeks yet, but in the meantime freight trains will be run through the tunnel with locomotives.

Brooklyn & Brighton Beach.—After two years of litigation the connection between the tracks of this

company and of the Kings County Elevated road is now to be carried out, the Supreme Court having just dismissed injunctions obtained by property owners. The two roads are to be connected by means of an elevated structure running from the station of the Brooklyn & Brighton Beach road in Atlantic and Franklin avenues to the Kings County Elevated station in Fulton street and Franklin avenue, extending a little over a block. More than three years ago General Jourdan, who is president of both roads, applied to the city authorities for a franchise to make the connection, but the ordinance was secured only a few months ago. Some of the property holders then instituted mandamus proceedings to stop the scheme, and a decision against them was announced this week. It is now believed that there will be no further legal obstacles interposed, and that before another year there will be an uninterrupted route over the Kings County Elevated road from Fulton Ferry and the New York & Brooklyn Bridge to Coney Island. When the connection is completed the Kings County road will also be able to compete for the traffic from the Flatbush district which the electric street lines are now getting.

Carthage & Adirondack.—The extension from Benson Mines, the present terminus in St. Lawrence County, New York, has been located in a northeasterly direction to the Newton Falls in the Oswegatchie River, a distance of about 3½ miles. The contract for the grading has been let to W. J. Semper, Watertown, N.Y., and work is to be started about May 1, and completed by July 16. The track laying and ballasting will be done by the company. The grades are light, with the exception of one maximum grade of 118 ft. to the mile. The maximum curve is 8 degrees. The work is fairly light, with no high bridges or important trestles. The construction work will be in charge of W. J. Wilgus, of Watertown, N. Y., Assistant Engineer of the Rome, Watertown & Ogdensburg, which operates the Carthage & Adirondack.

Chicago, Milwaukee & St. Paul.—General Manager A. J. Earling denies the report which had been widely published in the daily newspapers that the company intended to extend its Lake Superior division from Green Bay to Casco Junction, Wis., to connect with the Ahnapee & Western and operate a line of freight ferries across Lake Michigan from Sturgeon Bay and to divert through eastbound shipments from St. Paul away from Chicago in order to save Chicago switching charges. Mr. Earling says it is absurb to think that the St. Paul would voluntarily give up a haul of over 400 miles for one of 100 miles

De Kalb & Great Western.—The contract for grading and tracklaying on this road has been let to Foley Bros. & Guthrie, of St. Paul. The work is very light; there are no natural obstacles to overcome, and both grade and curvature will be light. There will be no iron bridges or trestles. The financial arrangements assure the building of the road without bonded indebtedness. The route is from Sycamore (on the Chicago Great Western road, 52 miles west of Chicago), southwesterly six miles to De Kalb, Ill., on the Chicago & Northwestern. The surveys have been made, and construction will begin within 30 days. The officers of the company are Raymond Du Puy, Temple Building, Chicago, President; E. C. Lott, Vice-President; R. C. Wight, Secretary and Treasurer. The President will also act as Chief Engineer.

Hamburg & Southern.—This Company has filed articles of agreement in the Secretary of State's office at Little Rock, Ark. The stockholders propose to build a railroad from Hamburg in a southwestern direction to the state line, a distance of 17 miles. The incorporators are W. F. McCoombs, J. H. Pugh, John T. Norman and T. A. Jackson.

Kansas City Suburban Belt.—The Argentine branch of the Union Terminal Railroad at Kansas City, which is a portion of this line, has been completed and the formal opening occurred on March 26. The construction of this road practically finishes a system which encircles the Kansas City, reaching the grain elevators, stock-yards and packing-houses. The system has about 60 miles of track, intercepting railroads running into Kansas City. There has been frequent and prolonged litigation in connection with the construction of the road. The recent decision of Judge Caldwell at St. Louis finally ended the suits. That decree allowed a temporary crossing of the Missouri Pacific tracks to be made, an overhead crossing to be put in later.

Lima Northern.—This company was incorporated at Columbus, O., this week, its capital stock being $300,000, and its purpose the construction of a line from Lima, O., to the west line of the State. It is said that the company is composed of Chicago capitalists who wished to purchase the roadbed of the Columbus, Lima & Milwaukee, which was only partly built between Lima and Defiance, O., some years ago. It is understood that if they do not now get this roadbed, they will parallel the Columbus, Lima & Milwaukee grade. The incorporators are B.W. Fenton, Emery Lattenner, Ralph G. Spencer, A. A. Parman and J. B. White, Jr., several of whom were interested in the Findlay, Ft. Wayne & Western road.

Louisville & Nashville.—Mr. C. O. Bradford, Chief Engineer of Construction, has recently located a line from a point on the South & North Alabama Railroad, about 2½ miles south of Coosada station to Pratville, Ala. The distance is 12 miles, but no orders have yet been given to put the line under contract.

Monterey Mineral & Terminal.—A meeting of the directors of this company was recently held in Baltimore, at which plans for the active prosecution of the work at Monterey, Mex., were adopted. The grading is finished at the present time, and the tracklaying and bridging is carried on with a force of about 300 men. David Shaw, of Monterey, has the contract for all the construction work. The railroad is to be about 15 miles long, and will connect the smelters at Monterey with the mining districts of San Puebla and San Pedro. At Monterey it makes connections with the Monterey & Northern railroad and the Monterey and Mexican Gulf railroad. A number of the officers and directors of the latter company are largely interested in the new project. The chief financial interest in the company is held in Baltimore. Mr. Wm. Johnston, of Liverpool, the owner of the Johnston line of steamers from Liverpool to Baltimore, is President of the company. C. K. Lord, Vice-President of the Baltimore & Ohio, is Vice-President of this line, and J. A. Robertson, of Monterey, is the General Manager. Other officers are given in another column.

Montgomery & Prattville.—Articles of incorporation were filed at Montgomery, Ala., this week by this company to build a road from Coosada station on the Louisville & Nashville nine miles above Montgomery, to Prattville. The incorporators are Daniel Pratt, W. T. Northington, of Prattville; Wilton H. Smith, W. W. Thompson, H. W. Bruce, J. H. Ringold and R. H. Ingram, of Louisville, Ky. The latter represent the Louisville & Nashville, which has had the road surveyed through the gravel and ochre beds near Rocky Mount, in Elmore county, to and around Prattville.

Northern Pacific.—The Tacoma, Olympia & Gray's Harbor Railroad, a branch of this company, in the coast counties of Washington, will be completed and in operation from Aberdeen Junction to Aberdeen this week. The new road is only about a mile long, and is a branch graded by the residents of Aberdeen, which was left off the line when it was constructed a few years ago.

Ottawa, Arnprior & Parry Sound.—This road has been extended to Whitney, Ont., a point 144 miles west of Ottawa. It was previously in operation for about 125 miles west of Ottawa. The line is under contract to Emsdale, Ont. The Parry Sound Colonization Railroad, the name under which the division between Emsdale and Parry Sound is being built, has been opened for traffic to Rankin, 40 miles west of Emsdale. Both roads are operated by the Canada Atlantic.

Pennsylvania.—A contract has been given to William McAdams, for the change of location of about a mile of main line of the Philadelphia & Erie portion of the Pennsylvania Schuylkill Valley Railroad, near Morea, Pa. The change is made necessary by mine workings. The grading will be completed in about two months.

Pittsburgh & Eastern.—The officers of this company announce that plans and specifications will be ready for contractors to bid on within the next 60 days. Only a 20-mile section will be awarded at present. This section, extends from Mahaffey, with a connection with the Beech Creek road, to Sankin's Summit, at which point the new road will strike the Cush Creek coal region. After this section is completed, about Oct. 1 next, work will be continued to Saltsburg and Latrobe. There will be some heavy work on the first section, including three bridges of over 300 ft. each across the Susquehanna River. S. H. Hicks, of Philadelphia, is President.

Port Huron & Lexington.—Edgar H. Brennan, of Toledo, O., has made a proposition to the Chamber of Commerce of Port Huron, Mich., to build a railroad from that city to Lexington, if the citizens of Port Huron give a bonus of $15,000 and secure the right of way through St. Clair County. This road was agitated last summer, and the citizens of Lexington subscribed $30,000. Nearly all of the right of way necessary has been secured.

San Francisco & San Joaquin Valley.—As the result of a conference between the State Officers and the Board of Harbor Commissioners, held in Sacramento on March 23, a lease will be granted to the San Joaquin Valley Railroad for the site of its proposed station at San Fancisco. This tract of land will be rented to the railroad at an annual cost of $1,000. It contains about 24¼ acres of land facing on Kentucky and Fourth streets, near the present Southern Pacific passenger and freight station.

Toledo Southwestern.—This company was incorporated in Ohio last week to build between Clay Center, O. and Curtice in Ottawa County, the route lying between the Lake Shore & Michigan Southern and Wheeling roads. The incorporators are Fredrick H. Dodge, N. P. Dodge, Alfred C. Johnson, H. P. Yaryan and David M. Arndt. The road will commence near Martin, and the right of way is secured as far as Lime Kilns and the right of way to Curtice will soon be secured. The ties are purchased and the track will be laid when the frost is out of the ground. The object is to open up the lime country in the vicinity of the Toledo White Lime Co's plant, and no passenger trains will be used.

Tuscarora Valley.—The extension of this line from East Waterford, Juniata County, into Path Valley, Franklin County, Pa., is graded to Blair's Mill, about one mile south of Waterloo, Juniata County, and about three miles north of Concord. It is also graded one mile south of Waterloo, about eight miles from Dry Run, the proposed terminus, and will enter the Valley at Concord Narrows. About a mile and a half of road is graded between Dry Run and Concord.

GENERAL RAILROAD NEWS.

Delaware River & Lancaster.—Judge Dallas, in the United States Circuit Court at Philadelphia, appointed Anthony N. Zane Receiver of this Railroad in Eastern Pennsylvania. The suit is brought by Henry A. V. Post and and Charles C. Pomeroy, of the New York building firm of Post, Martin & Co., holders of certain of the first mortgage bonds which are in default.

Georgia Southern & Florida.—This railroad was sold at foreclosure sale at Macon, Ga., on April 2, for $3,600,000, to a representative of the Baltimore bondholders' committee. This was the third time the road had been offered for sale. On the first sale day the limit was fixed at $4,500,000, on the second at $3,750,000, while on Tuesday last it was $3,000,000. The plan for reorganization is understood to provide for issues of new securities as follows: $4,000,000 first mortgage 30-year gold bonds, $684,000 first preferred stock, $1,015,600 second preferred stock, $4,000,000 common stock. These will be distributed thus: Holders of each $1,000, Georgia Southern & Florida bond to receive one $1,000 first mortgage 5 per cent. bond of the new company, with $200 of first preferred, $180 of second preferred and $800 of common stock.

Jacksonville, Tampa & Key West.—Final foreclosure proceedings were begun at Jacksonville, Fla., on April 1, in the United States Court on the part of a mortgage of $4,000,000 held by the Pennsylvania Company for the Insurance of Lives and Granting of Annuities against the Railroad Company; the American Construction Co., and others. Of the $4,000,000 only $1,716,000 is at issue, the balance being held as collateral security for notes given by the defendant companies. The case is very complicated and the control of the property depends upon the issue of the present suit. The litigation was begun in July, 1892 when R. H. Coleman of Lebanon, Pa., was President. Afterwards R. H. Cable was appointed Receiver to represent Mr. Coleman's interest. J. H. Durkee is now Receiver.

Lehigh & New England.—The purchasers of the property and franchises of the Pennsylvania, Poughkeepsie & Boston Railroad at the foreclosure sale held on Dec. 14, 1894, have organized a new corporation under the above name, the capital stock fixed at $1,500,000, divided into $50 shares. There has also been authorized an issue of $1,000,000 of bonds. William Jay Turner was elected President, and the directors are: William B. Scott, John W. Moffly, Joseph F. Sinnott, W. W. Gibbs, W. W. Kurtz and Simon Pfaelzer. The new company will operate the road from Slatington, Penn., to Campbell Hall, N. Y., 95 miles altogether.

Middlesborough Belt.—Judge Barr, of the United States District Court, at Louisville, has ordered the sale of the railroad, as the result of the foreclosure suit brought by the Atlantic Trust Co., trustee of the first mortgage bonds. The bonded indebtedness is $454,000, on which there is an accumulation of defaulted interest. The road is 28 miles long, skirting the Cumberland Mountains at Middlesborough, Ky., and was expensive to build, but is now much depreciated in value.

New York, Lake Erie & Western.—The receivers of the company report the following earnings for February:

	1894.	1895.	Inc. or Dec.
Gross earnings	$1,582,044	$1,766,438	I. $184,394
Oper. expenses	1,279,472	1,427,609	I. 148,137
Balance	$302.572	$338,828	I. $36,256
Rentals	140,939	166,873	I. 25,934
Net earn	$161,633	$171.955	I. $10,322
Loss on auxiliary lines	69,513	55,368	I. 14,145
Net earn	$92.120	$116,587	I. $24,467

OCTOBER TO FEBRUARY 28.

	1893-4.	1894-5.	
Gross earnings	$10,882,009	$10,383,743	D. $498,266
Oper. exp	7,812,452	7,668,149	D 144,303
Balance	$3,069.557	$2,715,594	D. $353,963
Rentals	969,853	963,217	D. 6,636
Net earn	$2,099,704	$1,752,377	D. $347,327
Loss on auxiliary lines	145,727	266,837	I. 121,109
Net earn	$1,953,977	$1,485,540	D. $468,436

The gross earnings include, for both years, the income from other sources, with the exception of interest on securities, and the working expenses include the deductions from income with the exception of the fixed charges and the state taxes. The Chicago & Erie reports gross earnings for February of $183,190, an increase of $23,016 as compared with the same month of last year.

Philadelphia & Reading.—The railroad company on April 1, defaulted in the payment of $7,000 interest on the bonds of the Chester Valley Railroad and $1,000 interest on the bonds of the Canton County Road. The interest, which is due semi-annually, is respectively upon issuances of $360,000 and $39,000. The reason for the non-payment by the lessees was that the interest had not been earned.

The application recently made to the United States Circuit Court at Philadelphia, for the New York syndicate known as the Junior securities' Protective Committee, composed of holders of $4,229,000 of the Company's junior securities, to be allowed to intervene as defendants in the equity proceedings begun by the Pennsylvania Trust Co., for the foreclosure of the general mortgage, has been granted by Judge Dallas. The petition is by R. M. Gallaway, Isaac N. Seligman, David G. Leggett, Simon Wormser and Emanuel Lehman.

Southern.—The company reports the following earnings for the month of February, with a comparison with the corresponding period in 1894.

	Feb., 1895.	Inc. or Dec.
Gross earnings	$1,2 6,458	D. $191,834
Oper. expenses	867,612	D. 142,360
Net earnings	$388,846	D. $49,474

From July 1, 1894, to Feb. 28, 1895, the earnings were as follows:

Gross earnings	$11,498.894	D. $323,232
Oper expenses	7,557,628	I. 169,759
Net earnings	$3,941,266	D. $49,299

TRAFFIC.

Traffic Notes

On April 29 the New York Central will begin running two solid trains each way daily between New York and Montreal by way of the Mohawk Division and the Canadian Pacific.

The "Sunset limited" train of the Southern Pacific, between New Orleans and San Francisco, will make its last trip for the season on April 11. The company announces that the service will be resumed next winter on a larger scale.

The merchants of Denver have given up their attempt to establish a freight bureau, the necessary financial support having failed to materialize; from which it would appear that the merchants are not so much hurt by existing rates as might appear from some of their claims.

The Philadelphia & Reading has put on additional trains to Germantown and Chestnut Hill, as outlined in these columns last week, and has reduced the fares about one-half. To and from Germantown, 7 miles, the single fare is 10 cents, round trip 15 cents. The people of Manayunk are now complaining because the round trip fare from their town to Philadelphia has not been reduced as much as has the Germantown rate, the distance being about the same. On the first day of the reduction the traffic on the Germantown line increased about 50 per cent.

The Pennsylvania has issued a circular to clergymen announcing that reduced rates will be continued to them during the remainder of the present year. An officer of the road states that the company has had no intention of withdrawing the reduced rates at any time.

The Erie Lines, from Chicago to Salamanca, recently hauled more freight cars in a single day than ever before in their history.

The Baltimore & Ohio Southwestern gave notice some time ago that it would withdraw from the agreement not to pay commissions on eastbound tickets, and the time has arrived for this notice to take effect. There have been contradictory reports about action of the road looking to a withdrawal of the notice, but at last accounts the General Passenger Agent said that no such action had been taken.

The Southern Railway Company has asked the Inter-State Commerce Commission to suspend the long and short haul section of the Interstate Commerce law so that it may be able to meet the low passenger rates of the Seaboard Air Line to Atlanta and other places without making corresponding rate reductions to intermediate stations. The Commission will investigate the matter at its office in Washington, on April 6.

Southern States Passenger Association.

This new association, to take the place of the Southern Passenger Association, was fully organized at Atlanta on March 27, though the Executive Committee and the Rate Committee were not chosen at that time. It is said that all of the Southern lines in the old association east of Birmingham, Chattanooga and Montgomery, have either signed the agreement or have indicated that they will do so. W. W. Finley, General Traffic Manager of the Great Northern, at St. Paul, Minn., was elected Commissioner. H. Walters, President of the Atlantic Coast Line, is president of the association.